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INDEX TO VOLUME 1.

PAGE.
Abraxas? ribearia (Currant Moth.) 22
A difficulty in Studying Insects, 59
Advantages of Studying Entomology, 69
Ægeria exitiosa (Peach-tree Borer.) 27
Ægeria tipuliformis (European Currant Borer,) 29
American Currant Borers, 22
American Currant Moth, 22
Answers to Correspondents, 18, 34, 46, 64, 77, 89, 99, 111, 126
Apple-tree Blight, 21
Apple-tree Borers, (Illustrated.) 26, 47
Apple-twig Borer, (Illustrated.) 27
Army Worm, 97, 107
Banded Borer, (Illustrated.) 30
Black-Knot, 48, 76
Black Onion-fly, 4
Borers, 25
Bostrichus bicaudatus (Apple-twig Borer.) 27
Buprestis Borer, (Illustrated.) 26
Cabbage Bug, 110
Canker Worm.—Finding a Mare's Nest, 87
Canker Worm—Sulphur Remedy, 96
Caterpillars on Fruit-trees. How to destroy them, 83
Cecidomyia destructor (Hessian Fly.) 37
Cecidomyia grossulariæ (Gooseberry Midge.) 23
Cerasphorus cinctus (Hickory Borer.) 30
Chinch Bug, 47, 95
Chrysobothris femorata (Apple-tree Borer.) 26
Click Beetles, 83
Clisiocampaa mericana (Tent-Caterpillar.) 6, 14, 19
Clover Worms, 82
Clytus pictus (Hickory and Walnut Borer.) 29
Clytus robiniæ (Locust Borer.) 28
Corn Grub, 73
Correspondence, 6, 19
Cucumber-Bug, (Illustrated.) 110
"Cui Bono?" 5
Curculio, 74
Curculio—New Remedy, 96
Currant and Gooseberry. Insects on 22

PAGE.
Currant Borer, (Illustrated.) 22, 29
Currant Moth, 22
Cut-Worms, 85
Diabrotica 12-*punctata* (Flower-Beetle.) 110
Diabrotica vittata (Striped Cucumber-Bug.) 110
Distribution and Habitat of Insects, 90
Doctors Differ, 96
Doryphora 10-*lineata* (New Potato Bug.) 3, 84
Doryphora juncta, 3
Driving Nails into Fruit Trees, 87
Egg-parasite upon the American Tent-Caterpillar. Notice of an 14
Elder Leaves and Insects, 73
Ellopia ribearia (Currant Moth.) 22
Entomology all a Humbug, 39
Entomology. The Study of 57
Entomology. The advantages or Studying 69
Ennomos subsignaria (City Measuring Worm.) 57
Eriosoma lanigera (Wooly Apple-tree Blight.) 21
European Currant Borer, 22
Experience with the Canker Worm, 96
Flea Beetle of the Grape Vine, 40
Flower Beetle, (Illustrated) 110
Gooseberry and Currant. Insects on 22
Gooseberry Midge, 23
Gooseberry Moth, 23
Gooseberry Saw-fly, 117
Grain Plant-louse, 96
Grape Vine Flea Beetle, 40
Great discovery in destroying the Hessian Fly, 108
Habitat and Distribution of Insects, 90
Haltica chalybea (Grape-vine Flea Beetle.) 40
Hessian Fly, 108
Hickory Borers, (Illustrated.) 29, 30
How to destroy Caterpillars on Fruit Trees, 83
How to Kill Sheep Ticks, 74
How to obtain the Names of Insects, 62
Imported Insects, 117
Insects and Elder Leaves, 73
Insects and the Cholera, 9

SMITHSONIAN LIBRARY

Page

Insects. Habitat and Distribution of . . . 90
Insects infesting the Currant and Gooseberry, 22
Insects on Elm Trees, ... 15
Joint Worm, ... 10, 37
Lachnosterna quercina (White Grub.) . . 60
Lema trilineata (Potato Bug.) . . . 105
Locust Borer, (Illustrated.) 28
Lytta atrata (Potato Bug.) . . . 3, 107
Lytta cinerea (Potato Bug.) 3
Lytta vittata (Potato Bug.) . . 3, 107
Means of defence against Noxious Insects, . 35
Measuring Worm, ... 57
Names of Insects. How to obtain them, . 62
Names for Insects—Popular. . . . 97
Names for Insects—Scientific. . . . 97
Nematus ventricosus (Imported Gooseberry Sawfly,) 120, 125
New Humbug, ... 108
New Potato Bug and its Natural History, 1, 84, 88
New Potato Bug in Maine, ... 105
Note on Black Knot, ... 76
Notes on *Doryphora* 10-*lineata*—Potato Bug, 84
Noxious Insects. Means of defence against . 35
Noxious Insects. Popular remedies for . 71
Oil upon Fruit Trees, ... 96
Onion Fly, ... 4
Onion Fly. A Remedy, ... 20
Ortalis flexa (Onion-fly.) 4
Outlines of the Study of Insects, (Illustrated.) 74, 94, 106
Painted Borer, (Illustrated.) 29
Peach Tree Borer, (Illustrated.) . . . 27
Pear Tree Borer, (Illustrated.) 26
Plant-louse of the Grain, ... 96
Popular Names for Insects, ... 97
Popular Remedies for Noxious Insects, . 71
Potato Bug and its Natural History, 1, 84, 88
Potato Bugs, ... 107
Potato Bug in Maine, ... 105
Pristiphora grossulariæ (Native Gooseberry Sawfly.) 123

Page

Psenocerus supernotatus (Currant Borer.) . 22
Quince Tree Borer (Illustrated.) . . 26
Remedies for the Currant Worm, . . . 73
Remedies for Noxious Insects, . . . 71
Rhynchœnus Strobi (White Pine Weevil.) . 20
Saperda bivittata (Apple-tree Borer.) . 26
Sawfly of the Gooseberry and Currant, 23, 117
Scientific Names, ... 97
Selandria ribis, ... 23
Sheep Ticks. How to kill them . . . 74
Silk-producing Lepidoptera. Remarks on 13, 38, 58
Strachia histrionica (Texan Cabbage Bug.) 110
Striped Cucumber Bug, (Illustrated.) . 110
Studying Entomology. The advantages of . 69
Studying Insects. A Difficulty in . . 59
Sulphur for Canker Worms a Failure, . . 96
Sulphur-cure, ... 125
Ten-striped Spearman—Potato Bug, . . 84
Tent-Caterpillar. Notice of an Egg-parasite on 14
Tenthredo ribis, ... 125
Texan Cabbage Bug, ... 110
The Study of Entomology, ... 57
The "Thrips" of the Vine-growers.—What is it? 20
The two-striped Borer, (Illustrated.) . . 26
Tobacco Worm, ... 74
To cure Wormy Trees, . . . - - . 72
Tomato-Worm Story, ... 5
To prevent Weevil in Wheat, . . . 73
Trichina spiralis, ... 62
Trochilium tipuliforme (European Currant Borer,) 22
Twelve-spotted Flower Beetle, (Illustrated.) 110
Walnut Borer, (Illustrated.) 29
Weevil in Barns, ... 73
Weevil in Wheat, ... 73
White Grub, ... 60
White Pine Weevil, ... 20
Wooly Apple-Tree Blight, ... 21
Wormy Trees, ... 72

ERRATA.

Page 77, column 1, line 4, for "*Serica tricolor*" read "*Serica iricolor*."

Page 77, column 2, line 24 from bottom, for "all the true Bugs" read "almost all the true Bugs."

Page 78, column 1, line 3, for "without food" read "without teeth."

Page 102, column 1, line 35, for "properly speaking" read "popularly speaking."

Page 118, column 2, line 37, for "single mammal" read "single genus of mammals."

Page 123, column 1, line 37, for "similar" read "singular."

Page 125, column 2, line 22 from bottom, for "1860" read "1840."

THE

Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for gratuitous distribution among Farmers and Agriculturists.

VOL. I. OCTOBER 30, 1865. No. 1.

THE POTATO.

The New Potato-bug, and its Natural History.

BY BENJ. D. WALSH, M. A.

There is a new and very destructive enemy of the Potato, which within the last five years has spread from Colorado and Nebraska into Iowa, and within the last year and a half has crossed the Mississippi into Illinois, and as it seems into Wisconsin also; whence in course of time it will probably travel onwards to the Atlantic, establishing a permanent colony wherever it goes, and pushing eastward at the rate of about fifty miles a year. The following extracts will give some idea of the way in which this insect operates, where it has once made itself a home, and of the dates of its first appearance in different localities.

Thos. Murphy of Atchison, Kansas, says that in August, 1861, they were so numerous in his ten-acre garden, "that they would almost cover the whole potato-vine, eating up everything green on it," and that he has "often in a very short time gathered as many as two bushels of them."—(*Valley Farmer*, July, 1862, p. 209.)

In August, 1861, J. Edgerton of Gravity, Iowa, says that "they made their appearance upon the vines as soon as the potatoes were out of the ground, and there being a cold, wet spell of weather about that time, they devoured them as fast as they were up."—(*Prairie Farmer*, August 29, 1861, p. 116.) And from New Sharon, Iowa, Dr. Fitch was informed in 1863 "that some have been discouraged from planting potatoes, the ravages of this potato-bug have been so great."—(*Trans. N. Y. State Agr. Soc.* 1863, p. 798.)

D. Kilpatrick of Linton, Iowa, under date of June 30, 1865, says "I took more than a gallon of bugs this morning from eleven rows of potatoes eight rods long. Eternal vigilance is the price of potatoes in this section."—(*N. Y. Sem. Tribune*, July 18, 1865.)

Norman Matteson, of Iowa, June 1865, says that "the only way they can grow potatoes there is to go over the field every day, and destroy the eggs of the potato-bug which are laid upon the leaves." (*Ibid.* July 7, 1865.)

Later in the year "Dr. Trimble placed upon the table of the New York Farmers' Club a large handful of letters, boxes, bottles and packages from Iowa, all of them containing a repetition of the same sad story, touching the terrible pest now afflicting potato-growers at the West."—(*Ibid.* Aug. 1, 1865.)

In August, 1864, I received from Prof. Worthen, the State Geologist of Illinois, specimens of this insect, with a statement that "it is committing the most destructive ravages on the potato crop in the vicinity of Warsaw, [a town on the Mississippi river in Central Illinois,] so as to threaten the loss of the entire crop on many farms." I find that the same insect in the same year appeared on the potato in considerable numbers near New Boston, Illinois, another town on the Mississippi river a little above Warsaw. In the autumn of the same year I captured myself two specimens in Rock Island, another town still higher up on the same river; and in 1865 it has been quite abundant there, completely destroying some pieces of potatoes and utterly ruining the egg-plants in my garden; but up to this date it has not reached a point lying thirty miles to the east of us in such numbers as to be noticed by farmers. I hear from reliable sources that it has also swarmed on the potato this year near Mt. Carroll—a point situated about ten miles from the Mississippi near the northern border of the State—and in the neighborhood of Alton, which lies on the east bank of the Mississippi not many miles above St. Louis. It does not appear to have advanced as yet any considerable distance into the interior of the State; but from the above facts it results, that it must have crossed the river into Illinois in 1864 and 1865 at no less than five different points, the northernmost of which lies over two hundred miles in a straight line from the southernmost. Hitherto noxious insects in the United States have been found to travel from the east towards the west. We have here the first instance on record of a noxious insect travelling from the west towards the east.

But, it will be asked, where does this insect come from? And how does it happen that it did not trouble the Iowa farmers before 1861, and the Illinois farmers before 1864? I believe that I can explain this satisfactorily. Unlike several other noxious insects, it is not a general feeder, but is confined to plants belonging to the botanical family *Solanaceæ*, and especially to the genus *Solanum*, which includes the Potato, the Tomato, the Egg-plant, and a weed called the Horse-nettle, found more usually in the Southern States, but which also grows in certain localities in Iowa.* In 1864 Dr. Velie, the ornithologist of Rock Island, Ill., and Dr. Parry, the botanist of Davenport, Ia., both saw this insect in very great numbers in Colorado, feeding upon a wild species of *Solanum*—the *rostratum* of Dunal—which is peculiar to that region of country and is not found east of the Mississippi River; and to the former gentleman I am indebted for numerous specimens collected by him on this plant, which are undistinguishable from those found on the potato. Assuming, therefore, that this wild *Solanum* is the natural food of the insect, and that the region of country bordering on the Rocky Mountains is its natural home, its range would for a long series of years be limited by the range of the plant that it feeds on. But in process of time civilization marched up to the Rocky Mountains—potatoes were planted in Kansas and Nebraska and Colorado—and the insect discovered that one species of *Solanum* was about as palatable as another. Having thus acquired a taste for potato leaves, it would naturally spread eastward from potato patch to potato patch, till it overspreads Iowa and finally overleaped the Mississippi into Illinois. In confirmation of this theory, R. W. Hazen of Fremont, Dodge Co., Nebraska, says that "the potato bug which is so destructive in that region was first discovered in 1859, about 100 miles west of Omaha City, whence they have been marching eastward annually."—(*N. Y. Sem. Tribune*, July 18, 1865.) From Omaha City to Rock Island is over 260 miles; so that, if the above statement be correct, it appears that the insect has travelled about 360 miles in six years, or at the average rate of sixty miles a year. At this rate of progress it will reach the Atlantic in about fourteen years.

It may perhaps be worth stating here, that my own experience is that these insects prefer the Egg-plant to the Potato, and it is well known that they prefer the Potato to the Tomato. Now the Egg-plant is botanically more closely related to the *Solanum rostratum*, on which this insect feeds in Colorado, than is the Potato, the two former being covered with thorny prickles and the latter being smooth; and on the other hand the Potato is much more nearly related to the *Solanum rostratum* than is the Tomato, which last has by modern botanists been removed from the genus *Solanum* and placed in a genus by itself. It would seem, therefore, that the closer a plant comes to the natural food-plant of the insect, the better the insect likes it.

Dr. Fitch, in his Article on this Insect, published in the *Transactions of the New York State Agricultural Society* for 1863, (pp. 796—801,) asserts that "it has fallen upon the potato-vines in numerous places *all over the North Western States*," and Mr. Cyrus Thomas, as quoted by Dr. Fitch, says that "it was found in abundance in *Southern Illinois*" previous to 1861. But both these gentlemen confound together two perfectly distinct, but very closely allied species, the *Doryphora juncta* of Germar and the *Doryphora 10-lineata* of Say, one of which was really found in South Illinois previous to 1861, while the other was not, and one of which has never been known to attack the potato while the other habitually does so. The former of these was first described by Germar in 1824 from specimens which he had received from Georgia, and was also received by Dr. LeConte from the same State ten or twelve years ago. In 1854 Dr. Helmuth of Chicago took this same species near Cairo, Ill.; and in 1861 Mr. Chas. Sonne of Chicago captured very numerous specimens of it in Effingham Co., Ill., on hickory bushes, which they appeared to him to be feeding on. The latter species, which is the true potato bug, was never taken by any one, so far as I can find out, east of the Mississippi river till 1864, and was first discovered by Say in 1823 in the regions bordering on the Upper Missouri river, and is quoted by Dr. LeConte and Rogers as being peculiar to Texas, Kansas and Nebraska. That Dr. Fitch has confounded these two insects, is proved out of his own mouth; for he expressly states that they are synonymous, (*Trans.*, &c. p. 797,) although seven years before he wrote Rogers had pointed out the principal distinctions between them. (*Proc. Acad. Nat. Sc.* 1856, p. 30.) That Mr. Thomas must have confounded them, is indicated by the fact, that he says that his species "occurs in South Illinois only on worthless weeds and low shrubs, and here it has not proved injurious to useful vegetation"; whence he infers "that it is only accidental that it has fallen upon the potatoes" in Iowa, and that "some peculiarity of the plants, state of the atmosphere, or other influence may next year cause it to forsake the potato and take up its residence upon some other plant."—(*Trans.*, &c. p. 797.)

So closely indeed do these two insects resemble one another at first sight, that the Melsheimer Catalogue in 1853, and probably Thos. Say in 1824, considered them as mere varieties of one and the same species. Yet each has its own peculiar characters—each was originally confined to a distinct region of country—and one of them, at all events, and probably both, are limited to a distinct botanical family of plants and can feed on no other. For the benefit of those who are curious in such matters, I subjoin a table of the principal points of difference between the two species, which has been drawn up from a comparison of numerous specimens of each.

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* Mr. Terry of Crescent City, Iowa, states that in his neighborhood it attacked the Horse-nettle in 1863.—(*Prairie Farmer*, June 6, 1863, p. 356.)

D. juncta—8 *specimens from Mr. Sonne.*	**D. 10-lineata**—50 *specimens.*
1. Edges of all the stripes on the wing-cases, except the outer edge of the marginal one, accurately bounded by an acute groove, which is regularly punctate with a single row of punctures.	1. The same edges studded with very confused and irregular punctures, especially towards the middle of the wing-case, often in two or three irregular series, and partly inside, partly outside the edges.
2. The 2d and 3d stripes, counting from the outside, always united behind and generally before also.	2. The 3d and 4th stripes, counting from the outside, almost always united behind, only failing to be so united in a single wing-case of three specimens. In a single wing-case of two specimens the 2d, 3d and 4th stripes are all united behind.
3. Legs rufous, with a black spot on the middle of the front of all the thighs.	3. Legs rufous, with the knees and feet black.

Both Germar and Rogers erroneously state, that *juncta* has only four stripes on each wing-case. It has, in reality, just as many stripes as 10-*lineata*, though I am informed by Dr. LeConte that his Georgia specimens have the outer stripe "indistinctly defined externally." What Say calls "variety *a*" of 10-*lineata*, found in Arkansas, is apparently from his description nothing but *juncta*.

The question whether the species that destroys potatoes has existed for an indefinitely long time in Illinois, or whether it has within the last few years migrated thither from the Rocky Mountain Region, may seem to some of merely theoretical interest. It is, however, of great practical importance. On the first supposition, it is not probable that it will travel eastward; on the second supposition, it will most likely invade Indiana and Ohio within a few years, and finally pass on to the Atlantic States.

The new Potato Bug is not what naturalists call a *Bug*, but a true *Beetle*, belonging to the Order *Coleoptera* or *Shelly-wings*, and is rather more than ⅓ of an inch long, of so short an oval shape as to be almost as round as a grape, and cream-colored with 10 black lines or stripes placed lengthways on its back. Its wings are rose-colored and present a beautiful appearance as it flies. We may call it in English "the ten-striped Spearman," which is the meaning of the scientific name given to it. The above is the appearance presented by the perfect or winged insect, when its wings are hid under its wing-cases; but in the larva or immature state, it is a soft, elongate, 6-legged grub, of a dull venetian-red color with several black spots, but without any wings of course. There are four or five successive broods of them during the summer, and the larva of each brood goes underground to assume the pupa state. C. V. R. in the *Prairie Farmer* of August 8, 1863, who was the first to watch this insect through all its states, says that his specimens "hatched on the 14th of June and came out as perfect insects on the 10th of July, thus being scarcely a month going through all their changes." He confirms the conclusion at which I arrived in July, 1862, in the columns of the *Valley Farmer*, and which has been criticized and disputed by Dr. Fitch, (*Trans.*, &c. p. 798,) namely that the larva always goes underground to transform.

The insects commonly called "Potato-bugs," that have from time immemorial infested the Potato throughout the United States, are also Beetles like the "10-striped Spearman," but otherwise are in no wise related to it, being true blistering-beetles, belonging to the same genus as the common "Spanish-fly" of the shops, and raising just as good a blister as that does. Of these last there are three distinct species which have been known to attack the Potato, one of a jet-black color, (*Lytta atrata*,) one of a gray color, (*Lytta cinerea*,) and one of a yellow color with 4 or 6 black stripes placed lengthways on its back, (*Lytta vittata.*) Careless observers might confound this last with the "10-striped Spearman"; but the latter always has *ten* black stripes on its back, neither more nor less, and the former never has more than *six*. Besides, the whole shape and structure of the two insects is as different as that of a horse is from that of a hog. There is this essential difference, likewise, between the habits of the two, that the blistering beetles only feed on the potato in the perfect or winged state, whereas both the larva and the perfect beetle of the "10-striped Spearman" feed thereon, thereby, of course, injuring the vines to a much greater extent.

There are several species of lady-birds (*Coccinellidæ*), which destroy the eggs of this insect; and as the eggs laid by many of these lady-birds are of the same shape and color as those of the "10-striped Spearman," and are scarcely distinguishable but by their smaller size, being attached in the same manner to the leaf, care must be taken by those who undertake to destroy the eggs of the Potato-bug, not to confound those of their best friends with those of their bitterest enemies. The eggs of the "Spearman" are yellow, over 16th inch long, cylindrical, rounded at each end, and more than twice as long as wide, and they are attached by one end in clusters of 20 or 30 to the under surface of the leaf. It appears that in some localities a true Bug, belonging to the *Scutellera* family, and similar to the large, stinking bugs often found on raspberries and blackberries, destroys the "Spearman" while it is in the larva state, by puncturing it with its long beak and sucking out its juices. And Mr. Shimer of Carroll Co., Ill., finds that it is attacked in the same way, while in the larva state, by another cannibal Bug with its legs beautifully banded with black and white, (the *Harpactor cinctus* of Fabricius,) of which he has sent me specimens, and which I have myself noticed preying on a great variety of other insects.

Almost the only remedy, hitherto found to be effectual against the depredations of the "10-striped Spearman," is hand-picking them either in the egg, larva or perfect state, or shaking the larvæ and perfect beetles off the vines into shallow pans; for which purpose a tin pan with a lid similar to that of a common spittoon would probably be found very convenient, as the insects might then be shaken through the central hole from time to time, as they fall into the pan, and thereby be prevented from escaping. Dusting lime, ashes &c. upon the vines has been found to be perfectly useless, and both coal-oil and turpentine have been tried as preventives, and in the words of Mr. Hazen of Nebraska proved to be "no more use than so much water, as they soon evaporate." Mr. Orin E. Priest, of Mosinee, Wisc., however, has found that "turkeys are a perfect remedy for the potato-bugs;" and as the old-fashioned potato-bugs are deadly poison, and could not be eaten by turkeys with impunity, it seems to follow that his experience must relate to the Rocky Mountain insect, and consequently that this species had already in 1865 made its way, not only into Illinois, but also into Wisconsin. "I had," he says, "a patch in my garden literally covered with the bugs, which was all cleared off by turning in the turkeys three or four times. Also a piece in the field, in which I turned a turkey with a brood of young; and there they have kept them all off, and to-day there is no sign of a bug to be seen." (*N. Y. Sem. Tribune*, Aug. 29, 1865.) Turkeys have from time immemorial been employed occasionally for "worming" tobacco, the objection to which practise is that they injure many tobacco-leaves. As the same objection will not apply in the case of the potato, they may probably be found very useful assistants in combating the "10-striped Spearman." At first sight we might suppose that common fowls would answer an equally good purpose; but I am told by those who have tried the experiment that they are comparatively inefficient.

ROCK ISLAND, ILLINOIS, Sept. 23, 1865.

THE ONION.

The Black Onion-fly.

Mr. Henry Shimer, of Mount Carroll, Illinois, gives, in the *Prairie Farmer*, Sept. 2nd, 1865, a short notice and description of a dipterous insect which is very destructive to the Onion in his neighborhood. The scientific name of this fly is *Ortalis flexa*, Wiedemann. It was first described by Wiedemann in 1830, as belonging to the genus *Trypeta*, subsequently by Walker as *Trypeta arcuata*, and removed to *Ortalis* by Loew. The fly is about one-third of an inch in length, black, with three oblique white stripes on each wing. Mr. Shimer says, "In the latter part of June, I first observed the larva or maggot among the onions here. The top dead, tuber rotten, and the maggots in the decayed substance. From them I bred the fly. They passed about two weeks in the pupa state. At that time I first observed the flies in the garden, and now a few are to be found. Their favorite roosting place is a row of asparagus running along the onion-ground, where they are easily captured and destroyed from daylight to sunrise, while it is cool and wet. During the day they are scattered over the ground and on the leaves and stalks of the onions, and not easily captured. Their wings point obliquely backward, outwards and upwards, with an irregular jerking, fanlike movement; flight not very rapid or prolonged. They are not very numerous, probably not over 200 or 300. All that I observed originated in one part of the bed, where they were doubtless deposited by one parent fly." Two broods appear in a season.

We are indebted to Mr. Shimer for specimens of this fly and its larva.—EDS.

The Practical Entomologist.

PHILADELPHIA, OCTOBER 30, 1865.

INTRODUCTORY.

It is hoped that the publication of this Bulletin will be attended with beneficial results to American Farmers and Agriculturists, since its pages will be filled with original papers illustrating the Natural History of the different species of Insects, which are more or less destructive to our annual crops of all kinds. The Agricultural Journals have, from year to year, presented through their columns, various recipes, as preventive of the attacks, or destructive to the life, of the "Curculio," the "Apple-moth," the "Squash-bug," etc. The proposed decoctions and washes we are well satisfied, in the majority of instances, are as useless in application as they are ridiculous in composition, and if the work of destroying Insects is to be accomplished satisfactorily, we feel confident that it will have to be the result of no chemical preparations, but of simple means, directed by a knowledge of the history and habits of the depredators. The fruit-growers are especially interested in this matter, since there is an increase in their complaints, that the insects which prey on their crops are yearly more numerous and consequently more destructive. The enquiring Agriculturist who reads this Bulletin must not expect to find recommended any peculiar brew, mixed according to certain quantities, as specific for any one or all of our insect enemies. He will find, however, we hope in course of time, that the real conditions of life and the transformations of each species, that shall recommend itself by its numbers as fit subject for discussion, will be faithfully recorded for his information by Entomologists whose time is devoted to this imperfectly understood subject, and that he will be enabled from the information thus obtained, to determine at what period of the insect's life the greatest quantities can be most readily destroyed by the simplest means.

Letters addressed to us will be answered through our columns, and phials containing specimens in alcohol, are solicited from any locality in the United States and Canadas.

We have already published a "Circular," in which the purposes of this Bulletin are set forth, and in this, our first Number, we renew our hopes and expectations that our undertaking will be sustained by both Scientists and Agriculturists, since it must be evident that the active coöperation of all interested parties will alone insure success in an undertaking which is a labor of Public benefit, without monetary recompense, and which we are peculiarly able, from our knowledge and collected material, to advance successfully.

THE TOMATO-WORM STORY.

The fatality which the human mind displays in returning to the idea, through successive generations, that whatever object is inexplicable at the moment to its ignorance in the entomological world, is hurtful and will "sting," is distressing to those who believe in the progressive intelligence of the human race.

Now, in this month of October, 1865, there is going the rounds of the country press, the following article, which we give in full.

> "Tomato Worm.—The Port Byron (N. Y.) Times says, that several persons near Auburn have recently been stung by a large worm that infested tomato vines, death ensuing within a few hours. A lady in Port Byron discovered one of these monsters on her tomato vines one day last week, and narrowly escaped being stung. The worm is described as about three inches long, of a green color and armed with claws and nippers, with a black horn extending in *front* some three-fourths of an inch long. A writer in the Rochester Express states that a few days since he took one of these worms from his tomato vines, and confined it about a week in a glass jar, awaiting its change into a chrysalis state. Upon being released it burrowed its way into the ground nearly a foot, or as far as the thread by which it was held would permit. Under the impression that it might resurrect itself another season in the miller form and become the parent of a numerous and destructive progeny, it was killed."

We have witnessed assemblages of boys armed with long sticks, engaged in the perilous attempt of "stirring up" a solitary moth which rested sleepily on a fence. Ensconced behind some tree or other protecting object, for security, the boys would sally out from this vantage ground and courageously attack the "monster," and we feel sure that these boys, grown up men, will ever retain a recollection of the address that saved them in such perilous enterprises. But what are these dangers to those encountered by the lady who narrowly escaped being stung by the harmless caterpillar of *Sphinx carolina?* And then the deaths; how is it that these never appeared in the obituary notices?

By whom ever it was described, the person, with some similarity to Uncle Toby in this respect, evidently did not know the right from the wrong end of a—caterpillar. The grown-up child, who confined the larva of a Sphinx in a glass jar, expecting it in that locality to change into a chrysalis, and who afterwards tied a thread around it, while the poor thing was intent on performing its natural transformations appointed by the Almighty, may perhaps be pardoned his ignorance from the circumstance, that he expected the worm would "resurrect itself in the miller shape,"—a reasonable conclusion, and one which we had not expected from his conduct, the latter leading us rather to anticipate, that he believed the poor thread-tied worm would transform itself into a venomous reptile, or full-fledged griffin. The "claws" and "nippers" indeed seem to favor the supposition that such a transformation might be expected, on the scriptural authority that the "last state" shall be "worse than the first." Seriously speaking, need we state that the "worm" is the caterpillar of *Sphinx carolina*, a lepidopterous insect, incapable of inflicting harm on any one, except by devouring a few eleemosynary leaves of the plant from which it derives its sustenance; that the "horn" is situate posteriorly on the "tail" segments, and not "in front;" that it undergoes its transformation into the chrysalis state underground and emerges the following spring as a "moth"? Truly, when we read this article, we thought the world could ill dispense with an Entomological Society, were it only to free it from imaginary fears and dangers.

"CUI BONO?"

Since Linnæus wrote a dissertational reply with the above title, many have ventilated their Latinity and criticism on the science of Entomology and Entomologists.

Whatever you may be pleased to say on other occasions, Messieurs Critics, and however you may distort the true meaning and ends of what is understood by what is "useful,"—*this* time at least you will be silent. For we step before you here with a work, which even you must concede to be utilitarian, and, should you repeat now the question with which we head this article, we can reply conclusively and in the same tongue—"Pro bono publico."

☞ Those wishing to receive a copy of the *Practical Entomologist* regularly, will please send with their names and address, twelve cents in stamps to pay the postage thereon for one year. All communications should be addressed to E. T. Cresson, Corresponding Secretary, 518 *South Thirteenth Street*, Philadelphia.

A NEW BOOK ON INJURIOUS INSECTS.

A TREATISE ON THE INSECT ENEMIES OF FRUIT AND FRUIT TREES, with numerous Illustrations drawn from Nature, by Hochstein, under the immediate supervision of the Author. By Isaac P. Trimble, M. D.—THE CURCULIO AND APPLE MOTH. New York: W. Wood & Co. 1865.

We have much pleasure in noticing a work which both faithfully and satisfactorily illustrates a topic full of interest to the Agriculturist. The subject of the depredations of the so-called "Curculio," (*Conotrachelus nenuphar*,) is treated by Dr. Trimble at considerable length, and with a lucidity and breadth of view which is much to be commended, while the Doctor's style of composition relieves, by its fanciful abruptness, the tedium which the reader is but too apt to feel on the perusal of a work of this description.

Faithfully trying the foolish recipes and nostrums, ever too readily offered by ignorance and vanity, the Doctor has found these wanting in efficacy against the insect enemies of our fruit, and from personal experience, offers good advice and recommends a natural and simple treatment to fruit-growers, such as will, we have every reason to believe, be followed, on being persisted in, by successful results, while the common sense of the Agriculturist will receive no offence from the means proposed to relieve his difficulties.

The illustrations, which are apt and pertinent, are the work of Mr. A. Hochstein, an artist whose faithful delineation of Entomological subjects, is well known to us, and has received our justly merited approval. In the present instance, Mr. Hochstein has treated the figures of insects with both delicacy and a considerable degree of scientific accuracy.

CORRESPONDENCE.

A friend from Maine writes: I think your proposed Bulletin will be the means of gathering and preserving much of importance and interest connected with the subject of Practical Entomology that would otherwise be lost, and which, if more widely known and distributed, as it could be through such a medium, would be productive of much good to the community. Notwithstanding the many that are engaged in the study of insects to a greater or less extent, and the much that has been written upon the subject, it is lamentable to see how wide spread is the ignorance in regard to it, even among those whose interest it is to possess a knowledge of insects and whose labors are affected by their operations. This is the case with us, and I presume we are no exception to the general rule. Take one example: The apple tree in Maine is badly affected by two insects—the "borer" (*Saperda candida* Fab.=*bivittata* Say), and the "tent caterpillar," (*Clisiocampa americana*). Now, notwithstanding the prevalence of these insects to so great an extent that every farmer's boy is acquainted with them in their larval state, I am justified in stating that there is hardly one farmer or fruit grower in twenty who is acquainted with them in their different states, or who would recognize them in their perfect state. This should not be. These parties must be aroused to their interests. They can never overcome an enemy of whom they know little or nothing. Much has been done in the past few years towards this end by the workers in the cause, but much remains to be performed, and therefore I accept your proposition as one of the means to produce the desired result. G. E. B.

CINCINNATI, OHIO, *October* 7, 1865.—Please find enclosed a *coccus* found upon a branch of Sugar Maple in the Fair grounds at Fort Wayne, Ind., last week, when in company with Thomas Meehan of your city. The tree appeared perfectly healthy, and the insects were confined to one branch so far as we could observe it. [This "coccus" is a species of *Lecanium*, belonging to the suborder *Homoptera*, and is probably undescribed. The scales are relics of dead females, covering and protecting their eggs and young. Mr. Meehan has also sent us specimens of this insect, which he collected probably from the same tree.—EDS.]

Clisiocampa americana has become quite rare on my place; it does consume *peach leaves*. See Fitch to the contrary.

Datana ministra is increasing terribly notwithstanding the annual destruction of millions in my young orchards. It appears sparingly early in July, and then abundantly a month later; their growth is rapid in early crop, and slower afterwards. Thinking they are of two generations, I am very watchful in July, but still they have increased alarmingly. Is not the *Datana* found so abundantly on the Walnut, Hickory and Oak, in some regions, a different species? [Probably *D. contracta*, Walker (vide Grote and Robinson's Paper in Proc. Ent. Soc. Phil. iv, p. 499). Send us specimens.—EDS.]

Clostera inclusa has almost disappeared in this neighborhood, though formerly abundant. I found the eggs of a parasite on it, at another locality, last year. Can this have diminished them? [Yes, undoubtedly so.—Eds.]

Hyphantria textor commences in May, and continues to appear through August and perhaps September. It is very abundant and omnivorous, or nearly so.

Is our Thrips in the vineyards, the *Tettigonia vitis?* (vide Harris.) [We should think not. *Thrips* and *Tettigonia* are two very different insects, belonging to different suborders, and cannot be confounded. Send us specimens of the "Thrips" for more definite information.—Eds.]

Next year will be Locust time here, and we have found some larvæ coming toward the surface, a few exposed in plowing and digging.

Have you learned the period of larvæ of Melolonthian, called White Grub, common in sod-lands? [Not definitely. Harris says: "At the close of their third summer (or, as some say, of the fourth or fifth) they cease eating, and penetrate about two feet deep into the earth," to assume the pupa state.—Eds.]

Rose-bugs are rare here, one or two pairs observed annually. I kill them.

Selandria rosæ has made its appearance here within two years; it is very plenty a degree north of us but increasing here. *S. cerasi* is scarcely known on pears and cherries.

John A. Warder.

SPECIAL NOTICE.

The Officers of the Entomological Society of Philadelphia, call the attention of the Public, to an open letter issued by them, soliciting donations to a Fund of $50,000, which is deemed necessary to be obtained in order to secure the welfare of the Society and its permanence, and to which fund $10,000 have been donated by the late Dr. Thomas B. Wilson. The Society offers an Honorary Membership to all who give monetary support to the Society at this juncture, while suggesting that the minimum sum to be tendered, be fixed at $100. To Subscribers, for the sum of $500 and upward, the "Proceedings" and various publications of the Society will be given free of charge.

☞ Any person who shall remit to the Secretary, annually, a sum of not less than One Dollar, or any larger amount, at his or her discretion, will be elected a *Contributing Member* of the Society, and will receive a Certificate of the same.

ADVERTISEMENTS.

☞ Advertisements to be sure of insertion, must be received BEFORE the 15th of the month.

N. B.—Advertisements of interest to the Farmer, Agriculturist, and Horticulturist, are solicited for the purpose of defraying the cost of publishing this Bulletin, which is distributed gratuitously throughout the country, thereby presenting a first-class medium for Agricultural advertisements. *No Advertisement of Patent Medicines or secret remedies admitted.*

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THE
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The Practical Entomologist.

PHILADELPHIA, NOVEMBER 27, 1865.

INSECTS AND THE CHOLERA.

The appearance of epidemic disease in Europe has turned the attention of the fearful among its inhabitants to the features presented by that Insect Life which always surrounds them, cholera or no cholera, but which, to their imaginations, are novel and concomitant with the disease now raging among them. We find the following in the columns of a late European newspaper:

> "The northern departments of France are at this moment suffering from a pest which to them is about as disastrous as an invasion of locusts in Southern latitudes. Vast and innumerable swarms of lepidopterous insects, belonging to the family of Noctuidæ, will settle down on a field of beet, and not leave it as long as there is still a fibre of the root left. Fire, acids, and every other powerful agent have been tried against them in vain; notwithstanding the most unremitting toil and care the insect multiplies to an alarming extent, so as to threaten the total destruction of beet, endive and cabbages, fortunately the only vegetables it chooses to attack."

These lepidoptera could only be destructive to the vegetation in their larval state, when their jaws or maxillæ are adapted to the mastication of those plants which constitute their entire food. In this state they do not fly, but are crawling, worm-like bodies or caterpillars. In the "perfect" or "moth" state the maxillæ are developed into spiral tongue-like processes, through which, as through a tube or sucker, they imbibe the various juices which constitute their sole nourishment. The amount of food taken by Butterflies and Moths in their perfect states bears no proportion to the quantities which their larvæ or caterpillars consume.

But we shall be able to draw a timely lesson from the apprehensions of Europe at this time, if we discard from our minds the fear that the prevalence of insects is a prognostic of disease, so that, if the cholera does visit our shores, we need not add to our causes of apprehension should our noxious insects be tolerably plenty next year, as, indeed, they always are in a greater or less degree.

Fear is a great detriment to a healthful body, and brings its own punishment in the greater liability of those who entertain it to take the very disease which they frightenedly seek to avoid. Let us then not be alarmed at anything we may see in the multiplication of insects next year, and be confident that had we only looked in years past, we should have seen the same destruction, so that we can firmly await the dispensations of a kind Providence, undisturbed by auguries of evil, and with a calmness which has its origin in our own common sense and in a knowledge that "He does not willingly afflict or grieve the children of men."

Κηϑὴν.

Now that the altars of the Summer are laid bare, the charred remains of their offerings after the October blaze swept away, their votary, the "z—ing" Cicada, long ceased his ministrations—we can meditate through these coming sleepful Winter months on the means to protect our crops next season, and be ready with intellect to circumvent physical agencies. Still, ere we set our brains to work to destroy, let us think a little on what is created by a kind Master for our use and enjoyment in Insects. Of old the poet has sung of the Cicada or "locust": "Almost thou art like unto the gods," and rightly, for to the idea of etherial immortality expressed by the butterfly, it seems to add supernatural power by its cry. Ask of it, rather than of your "spirit rappers," for information of the dead. Where it dwells is *ψυχομαντεῖον*.

But, perhaps, one would rather know that it is haustellate, and cannot destroy the leaves under which it lives. It could not well be so foolish or so ungrateful to its protectors—not being human; —the Latins have coined into a proverb, at least one of the proud privileges of humanity—*est errare.* For how many years has not the Cicada "rapped" in and around Rochester, before that place gave birth to false sounds to which credulity eagerly listened? In summer time they had the true sounds for nothing, yet many preferred the imitation.

The French manufacturer turns the yellow strands of silk into profit to himself and dress for others. The Mexican rears the cochineal and the East Indian the "crops" of lac. These, partly at least, comprehend the gifts of God. We, in the U. States, decry our insects and stigmatize them as "bugs," and they are all, more or less, objects of fear and aversion. We should remember the origin of the word "bug," which is Celtic:—"Tush, fright boys with bugs."—("Taming of the Shrew," Act 1)—and that it signifies a "ghost."—(Griffith's "Lift for the Lazy.") Did we generally know this the vulgarism would perhaps become obsolete and we should call our insects by their right (?) names. Were Providence to answer the prayers of some of us, our insects would appear no more. Can one conceive a Spring without a bee, a Summer without a butterfly, the "Dog-days" without a "locust"? Commerce would cry after its lost profits; Fashion would bewail her want of fresh trimmings; the Poet would mourn his lost friends. Nay, were this to happen, we should even burn our musquito bars in one great sacrificial pyre and implore the gods for the favor of being bitten.

THE JOINT WORM.

We copy the following paragraphs from the *Canada Farmer* of October, 1865:

"A correspondent in Cobourg is desirous of some information respecting an insect which has proved rather injurious to his early sown wheat, particularly that on dry knolls; he has sent us two small sections of wheat-straw, in which are imbedded the pupæ of the insect that has committed the depredations, and also some similar pupæ of last year's production, from which one or two tiny little flies have made their escape by eating a hole in the side. Out of these scanty materials it is, of course, impossible to determine with any certainty to what genus or species the insect enemy belongs; it is probable, however, from its generally attacking the second joint of the straw, that it is a species of *Eureptoma*, [Eurytoma] a small four-winged insect that has occasionally proved very injurious to the straw crop in the United States. In cases where much damage has been inflicted upon a crop, as the attack is made in the second joint of the straw, and so near the base of the plant, the only mode of preventing a recurrence of the injury is to burn the stubble containing the insect; for, of course, the greater part of the diseased portions will be left in the stubble when the grain is reaped.

"The tiny little flies which had eaten their way out of the sides of the pupæ of this insect are ichneumons or parasites, whose larvæ had preyed upon the grubs of the injurious fly. They are less than the twentieth part of an inch in length, of a dark metallic green color, and furnished with four transparent wings. These little flies and their congeners, which belong to one of the most extensive groups of insects, are of vast importance in the economy of nature, being designed by Providence for the prevention of too great an increase in the various species of insects, especially those that are of an injurious character; a superabundance of any peculiar kind being almost invariably attended with an increased proportion of its parasitic enemies."

The above throws some considerable light upon a subject of great practical importance to the Agriculturist, which has never yet been fully elucidated. For many years back it has been known that whole fields of wheat, rye, and barley have been destroyed in the States bordering on the Atlantic by a minute insect popularly called the "Joint Worm." All accounts agree in stating that this so-called "worm" is found in considerable numbers imbedded in a small, gall-like swelling in or immediately above the second joint of the straw, or at all events some joint not far from the ground; and that, in consequence of its operations, the portion of straw above the gall-like swelling withers and comes to nothing. This "worm" of course must, in all probability, be the larva of some insect; but to what Species, to what Genus, and even to what Family and Order it belongs, is at present wrapt in obscurity.

Both Dr. Fitch and Dr. Harris were originally of opinion that the Joint-Worm was the larva of a *Cecidomyia* or Gall-gnat, the same genus of insects to which appertain the common Hessian Fly and the Wheat-midge. Subsequently, however, because from a large quantity of the diseased straw they never bred anything but *Chalcis* flies, they both of them came to the conclusion that it must be the *Chalcis* flies that were the causes of the disease. And yet it is notorious that the *Chalcis* family—to which appertains the genus *Eurytoma* mentioned in the extract from the *Canada Farmer* —are generally parasitic upon other insects; and that, although hundreds of species of them are known to entomologists, in no one instance has it yet been satisfactorily proved, that any one of them is other than parasitic in its habits.

We have referred this subject to Mr. Benj. D. Walsh, of Rock Island, Illinois, who has paid special attention to the Natural History of Galls,* and has published Papers in our Proceedings on the

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*It may be incidentally remarked here, that all unnatural or diseased growths upon plants, no matter what their shape or color, which are caused by insects, are technically termed "Galls" by Naturalists.

Galls of the Willow and the Oak. He answers as follows:—

"I strongly incline to believe that the 'Joint-Worm' must be the larva of some Gall-gnat, and not, as certain authors have supposed, of a *Chalcis* fly, for the following reasons:—

"1*st.* I have had very extensive experience in breeding different species of Gall-gnats (*Cecidomyia*) from the Galls of the Oak, Willow, Solidago, Vernonia, Helianthus, &c.; and I find that it is very often the case, that from a gall which is fully proved to be the work of a Gall-gnat, I obtain nothing but *Chalcis* flies. The Gall-gnats generally are very difficult to breed to the Perfect Fly, and often die in the pupa state, and sometimes, if the gall is gathered too soon, in the larva state. On the other hand, I scarcely ever fail to obtain *Chalcis* flies of some species or other from the galls of the many different Gall-gnats that I have experimented on. Hence, it is not at all surprising to me, that both Harris and Fitch obtained nothing but *Chalcis* flies from the 'Joint-Worm' straw.

"2*nd.* I am acquainted with galls on the *Solidago* (Golden-rod) and the *Vernonia fasciculata*, which almost exactly resemble in their structure the 'Joint-Worm' galls, being oval enlargements of the stem, filled inside with a pale brown, spongy substance, in which are imbedded numerous minute cells. From both these galls I have bred large numbers of the *Lasioptera solidaginis* of Osten Sacken—a minute Gall-gnat—and also large numbers of *Chalcis* flies, belonging both to the *Eurytoma* group and to the *Pteromalus* group. From what is to all external appearance the same gall on the Golden-rod, but differing internally in being hollow with thin walls, I have also bred a small moth recently described by Dr. Clemens from a specimen furnished by myself.* This last I rather believe to be an 'Inquiline' or intruder upon the Gall made by the Gall-gnat; but it is possible that it is an independent gall-maker, having no connection with the Gall-gnat or its gall; and it is possible again that this Gall-moth may be the author of both these two kinds of Gall, and that the Gall-gnats bred from them may be mere Inquilines or intruders upon the Gall-moth. Those who desire to know more on this very difficult, curious, and interesting subject of Inquilines or Guest-flies may refer to my Paper on Willow Galls, pages 547–550, (*Proc. Ent. Soc. Phil.*, Vol. III). But be this as it may, I am quite certain that the *Chalcis* flies bred from these Golden-rod and Vernonia galls are parasitic on the Gall-gnats bred therefrom; and as the galls themselves so closely resemble those of the Joint-Worm, it is reasonable to suppose that the *Chalcis* flies bred from the Joint-Worm galls are also parasitic and not true gall-makers.

"3*rd.* The *Chalcis* fly obtained by Dr. Harris from swellings in the joints of the straw of Massachusetts barley is a distinct species, according to Dr. Fitch himself, from the *Chalcis* fly obtained by Dr. Fitch from similar swellings in the straw of New York barley, although closely allied to the latter and belonging to the same genus. Now, I am not aware of any recorded instance where two insects, specifically distinct, produce UPON THE SAME SPECIES OF PLANT galls or swellings which are indistinguishable in character. Dr. Fitch says himself, that he 'had confidently expected this barley straw from Central New York would give him the identical insect which had infested the Massachusetts barley.' Hence I infer that these *Chalcis* flies cannot be the authors of the Joint-Worm galls in barley. On the other hand, supposing these two distinct *Chalcis* flies bred from diseased barley straw, to be parasitic on some other species of insect which produced the gall-like swellings both in the Massachusetts and the New York barley, there is nothing at all unusual in the fact. For it is an every-day occurrence for the same species of insect to be parasitically infested by several distinct species.

"4*th.* Dr. Fitch, as quoted by Dr. Harris, (*Inj. Ins.* p. 555,) says himself that he found, in the Joint-worm galls of Barley, larvæ 'with a small V-shaped brown line marking the situation of the mouth.' Now, this 'V-shaped brown line' is manifestly the well-known 'breast-bone,' which is characteristic of the larvæ of the Gall-gnat family, and found IN NO OTHER LARVÆ. These larvæ, therefore, which Dr. Fitch himself found in Joint-worm galls, must necessarily have been the larvæ of some species of Gall-gnat. Why Dr. Fitch failed to recognize the importance of this character, as definitively proving his larvæ to be those of some Gall-gnat, is explained by the fact which I have elsewhere demonstrated, (*Proc.* &c. III, p. 616,) viz. that he knows nothing at all about it.

"Let us recur now to the extract from the *Canada Farmer*, in the light of the above suggestions, which I offer, not by any means as a complete solution of the question, but as mere opinions formed from the very incomplete evidence which has as yet been published. Three things are tolerably plain from this extract—1*st.* That the 'two small *sections* of wheat-straw, in which are imbedded pupæ' and which are located generally 'on the second *joint* of the straw,' are true Joint-worm galls. For if the pupæ had been those of the Hessian fly, it would not have been necessary to make a 'section' of the straw in order to exhibit them, as the pupa of the Hessian Fly always lies, not *inside* the straw, but between the straw and the shank of the leaf that enwraps the straw above every joint. 2*nd.* That the 'tiny little flies' bred from the pupæ found in the wheat-straw from Canada are *Chalcis* flies, probably belonging, not to the *Eurytoma* group, but to the *Pteromalus* group. 3*rd.* That they 'ate their way out of the sides of a certain

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*" *Euryptychia saligneana* Clem., described in *Proc. Ent. Soc. Phil.* V. p. 141. I had informed Dr. Clemens as to the gall inhabited by this insect, but he had, as he says, 'unfortunately mislaid my letter,' and has by mistake named and described the insect as inhabiting 'a willow gall.' The name of the insect, of course, must stand, however inappropriate; but the facts respecting its Natural History may as well be corrected here. Osten Sacken refers to this same gall *Proc. &c.* I. p. 369. The *Trypeta* gall which he there describes is well known to me, and quite distinct from the other two."

pupa' found in these 'Joint-worm' straws, and consequently that they must be, not gall-makers, but parasites, like all other *Chalcis* flies whose Natural History is accurately known. Whether that pupa is the pupa of a Gall-gnat, or of a Gall-moth, or of a Saw-fly, or of a Gall-fly, can be readily and certainly determined from the simple inspection of a single good specimen either dead or alive. But the particular genus and species to which the insect belongs, can only be found out by actually breeding the living pupa to the perfect state. For these two purposes I most earnestly solicit the gentleman in Cobourg, or the Editor of the *Canada Farmer*, to mail me immediately a few specimens of the pupæ spoken of in the above extract and the flies bred from them, packed in any small, stout, pasteboard box in cotton wool, so that they may not rattle about and get broken on the road; and so soon as Spring opens and the supposed Joint-worm galls have nearly got their growth, to mail me every three or four weeks, enclosed in oiled silk to prevent their drying up, a fresh supply of them, roots and all if practicable—say a good large handful at a time—until I notify him to stop, which I engage to do as soon as ever I have attained my object. This may seem unnecessary trouble and expense; but it is absolutely necessary for the end which we all of us have in view. In order to breed Gall-gnats with success, it is essential to have fresh galls from time to time; for by no method known to me—and I have tried dozens of different methods—can these delicate insects be kept alive any length of time in the Breeding-vase. I do not know what are the regulations of the Canada Post-office; but matter such as the above, provided there is no writing whatever but the Address, passes through our U. S. Post-office, when marked 'Seeds and Cuttings,' for a few cents. If sent by Express, they must be prepaid; and by that mode of conveyance would do best packed in a little damp moss in a tight tin vessel. If, as is possible but not very probable, the pupæ referred to above are merely those of the common Hessian Fly, I can immediately recognize the fact from specimens of this year's growth. And in that case it will not, of course, be necessary to send fresh specimens next spring.

" As it is always best to have two strings to your bow, and as the Joint-worm is common in several of the Atlantic States, I should also feel obliged to any person resident in those States who can supply me with specimens in the manner spoken of above. It is a positive disgrace to the Agriculturists of this country, that the Natural History of an insect, which has destroyed already millions of dollars' worth of their crops, should be so imperfectly known, that nobody can tell except by guess-work how, when and where to attack the offender, and nobody can even say for certain who the offender is. But can we wonder at this, when there are only one or two States out of the thirty-six, which think it worth while to maintain a State Entomologist? And when, among nineteen-twentieths even of well-educated persons, the term 'Bug-hunter' is a term of reproach and ridicule?

" The question proposed to be hereby solved is one, not of mere theoretical interest, but of real, practical, dollars-and-cents utility. Proceeding on the hypothesis of the *Chalcis* flies being the real authors of the 'Joint-worm' swellings, and knowing that the great majority of them stay in the butts of the straw through the winter, Dr. Fitch has recommended burning the straw and the stubble to destroy them; and his advice has been adopted, as we saw above, by the Editor of the *Canada Farmer*. But if, as I think is not at all improbable, the real originators of the disease come out into the perfect state in the spring or summer, and the *Chalcis* flies, which mostly stay in the straw through the winter, are parasitic upon these others, and are, therefore, our friends instead of our enemies; burning the straw and the stubble would be making war upon our own benefactors. I may be wrong; but I cannot help believing that these poor, slandered, little *Chalcis* flies have good ground for suing Dr. Fitch for defamation of character, and that they will, beyond a doubt, if they only know enough to commence suit, recover most exemplary damages from him."

ROCK ISLAND, ILLINOIS, NOV. 4, 1865.

TO ADVERTISERS.

An intelligible means of communicating with the Farmers and Agriculturists of this country is offered by the advertising columns of this BULLETIN to any one who has matters of business to bring to their speedy notice. The circulation is large and increasing, since the BULLETIN supplies a want which, we are assured, has been long felt by all of our intelligent Farmers, and of which we have ample proof in the number of letters we are receiving from all parts of the country from Farmers desirous of obtaining the paper regularly.

While we are anxious to carry our enterprise on successfully, we are obliged to rely on the proceeds from the Advertisements to enable us to continue the work. Hence the Farmers themselves, who are benefitted by our publication, can assist us by bringing our offers for Advertisements to the notice of those with whom they deal, and thus insure our financial stability.

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TO OUR WESTERN CORRESPONDENTS.

We have much pleasure in stating that Benj. D. Walsh, Esq., of Rock Island, Illinois, has consented to take charge of communications from the Western States, intended for the Editors of this Bulletin. It would be superfluous for us to speak of the attainments of so experienced and thorough an Entomologist as Mr. Walsh is known to be; we thank him for taking an interest in the welfare of our Paper, and relieving us of part of the labors of our position. Our Western Correspondents will please take note of this, and we trust that we shall soon receive communications from that quarter of interest to our readers and of benefit to our cause.

Communications should be sent to Mr. Walsh as early in the month as possible, so that he may have time to arrange the matter and forward it for insertion in the number of the Bulletin due the last Monday of the same month.

THE OHIO POMOLOGICAL SOCIETY.

We have much pleasure in receiving a circular of the Ohio Pomological Society, announcing their thirteenth annual meeting at the rooms of the Cincinnati Horticultural Society, commencing on Wednesday, Dec. 6. We sincerely trust that this Society, which is a great and active benefit to Western fruit-growers, will continue to receive popular support. We have received a communication from its President, John A. Warder, Esq., who has kindly and fully approved of the publication of our Bulletin, and we trust the time is not far distant when, by combined efforts, the capacities of our country for fruit growing may be better developed through the cultivation of carefully selected kinds and a dissemination of a correct knowledge of the different enemies with which the Agriculturist has to contend.

A few Remarks on Silk-producing Lepidoptera.

Many persons can remember the excitement which prevailed about twenty years since relative to the raising of silk in this country from the *Bombyx mori* L. or common silk-worm of Europe, and the quantities of mulberry trees—*Morus alba* L.—which were imported to feed the caterpillars upon, since this tree is not indigenous to America. The causes which, after a short period, led to the abandonment of the enterprise, are variously stated, but it seems that the result that it "would not pay," told more effectually than any other argument against its prosecution, which is now and has been for some time wholly neglected here. We much doubt that the *Bombyx mori* will do well in America, for the reason that our climate is intemperate, compared with that of France, Germany and Italy, in both its heat and cold. However this may be, it is well deserving of a fresh trial, since the question of the result not being pecuniarily satisfactory, is greatly modified by reason of our present heavy tariff. Labor, which is so cheap in Europe, is thus rendered accessible for the purpose in the United States, while, if this matter were taken up by the farmers generally, important results could be obtained in this way. Almost every lady, whether a farmer's wife or daughter, if informed as to the mode of caring for these caterpillars, would find it well worth the little trouble in rearing them, were she enabled to sell a few bushels of cocoons every year to the manufacturers. This would give "pin money" to many who make it now in more laborious occupations, while it would add wealth to our country, which sadly needs it at present, by increasing its productiveness and lessening the imports, which latter, now that our crops have more or less failed, for one reason or other, are the principal cause of the drain of specie hence to Europe.

The Patent Office at Washington has commendably brought before us one of the Asiatic silkworms, the *Samia cynthia* of Hübner (*Bombyx cynthia* Drury). This species feeds upon the *Ailanthus*, a Chinese or Asiatic tree, which grows very rapidly and thrives well in our climate. But in a Dutch translation of a Japanese work, which contains a treatise on the mode of raising and preparing this silk in Japan, we read that it thrives well in that country on various species of oak, such as *Quercus Sirocasi* Sieb., *Quercus serratus* Thun. etc. It would be well, therefore, to experiment upon some of our indigenous trees, in localities where the Ailanthus is not yet introduced. Kirby, in writing many years since on this species, says: "The Arindy silk-worm (*Saturnia cynthia* Drury), which feeds solely on the leaves of the Castor-oil plant (*Palma christi*), produces remarkably soft cocoons, the silk of which is so delicate and flossy that it is impracticable to wind it off: it is, therefore, spun like cotton; and the thread thus manufactured is woven into a coarse kind of white cloth of a loose texture, but of still more incredible durability than the last (i. e. *S. paphia*, of which species Kirby had previously been writing), the life of one person being seldom sufficient to wear out a garment made of it." It is not certain, however, that Kirby intends the species which has been introduced by our Patent Office, of which, however, the "moths" agree with Drury's representation of "*B. cynthia.*" Be this as it may, the species introduced by the Patent Office and which we determine as the *Samia cynthia* of Hübner, will certainly produce excellent silk, and deserves the attention, as we are informed it has already partially received here, of the manufacturer. This species belongs to the genus *Samia*, a genus erected in the "Verzeichniss," by Hübner in 1816, and of which he considered it typical, since it is first cited under the list of species, which that author considers as representing the genus. Of this species two broods can be obtained in one season in the United States, and consequently two crops of cocoons, from which the silk can be produced. The cocoons are elongate and cylindrical, of rather loose texture, and are fixed generally by means of an incomplete prolongation made first by the larva around the branch, above the cocoon itself. In this action, as indeed in its whole structure, the species approaches the American genus *Callosamia* Packard, which contains two indigenous species, *C. promethea*, and *C. angulifera*. The cocoons are much less dense than in our species and seem more practically of use in silk manufacture on this account. The group to which *Samia cynthia* Hüb., belongs, is one of the Lepidopterous family Bombycidæ, and has been recognised by Linnæus under the name "Attaci," characterized briefly as "*Alis patulis*" from the mode of holding the wings when at rest. To this group belong our genera *Telea* (polyphemus, Hübner), *Tropæa* (luna Hüb.), *Callosamia* (promethia Pack. and angulifera Pack.) and finally *Hyalophora* Duncan, a genus which differs importantly, structurally from Samia, and of which three species are hitherto described, viz: *H. cecropia*, Dunc., *H. columbia* (Samia columbia, Smith) and *H. Euryale* (S. Euryale, Boisd.)—the latter species a native of California.

In *Hyalophora* the large primaries are not falcate, properly speaking, as is the case in *Samia* and in *Callosamia*, while the shape of the secondaries is very different, these being more rounded and not produced at anal angle as are the somewhat lozenge-shaped secondaries of *Samia*. The neuration is also distinct. In *Hyalophora* the nervules are longer, more curvilinear, especially the fourth subcostal, which in *Samia* is straighter, shorter, and indeed somewhat inversely arcuate; the discal cell is also much larger, and the nervulation generally importantly modified. In *Samia*, also, the head is more produced and freer from the prothoracic parts; eyes larger; antennal pectinations slighter and tapering to the tips of the antennal stem. The generic characters are carried out in all the stages, but it is unnecessary further to insist on these here. In an article on Insect Architecture, Proc. Ent. Soc. Phil., p. 372, for 1863, Mr. Couper says "The insects are all they (i. e. "Students") care to make room for; large sums are expended to procure descriptive books at the very time nature's information is within reach, little thinking that the Chrysalis covering formed by the caterpillar reveals the genus to which it belongs." Nature indeed suggests the idea involved in the above remarks, but in a harmonious manner, that Mr. Couper's sentences would do well to imitate, while we never yet have taken insects ready ticketed and determined, so that "descriptive books" could be dispensed with, a "consummation" on some accounts, perhaps, "devoutly to be desired." Mr. Couper goes on to say, in explanation, "For instance, this year a young beginner [query:—why are beginners always "young," or at least said so to be? We know some "old" ones, and more honor to them that they diffidently acknowledge themselves to be only "beginners," which, we take it, when everything is said, we all are] rears the caterpillar of *Attacus luna*, which forms its cocoon, and in due time he procures the *imago*. Next year he finds a caterpillar of *Attacus polyphemus*, which, although a cogener differs from the former in form and markings. It also spins a like cocoon in size and texture, and in this way our young beginner discovers that he is in possession of two species of a genus." To this we may remark, that if the young beginner has any sharpness, he will quickly discover, from the cocoons themselves alone, that he has two species belonging to so many different genera, since the differences between the two are quite considerable.

We find, indeed, that the cocoons of all these large and more typical Bombycidæ are quite characteristic in the different genera, and that *Hyalophora*, *Samia*, *Callosamia*, *Telea* and *Tropæa*, produce cocoons that afford generic peculiarities in form and structure while retaining a common character peculiar to the "Group" or Sub-Family to which they belong.

It remains for us here but briefly to refer the reader to a notice of the *Samia cynthia* published in the Smithsonian Reports; to invite public attention afresh to this interesting subject, and to state that all the species we have here alluded to can produce silk in this country, and that they are all worthy of experiments. We read in a newspaper that in the South, during the war now happily terminated, a lady spun the silk from the cocoons of what was probably either *Hyal. cecropia* or *Tel. polyphemus*, and made certain of the smaller articles of clothing out of it. At a subsequent period we shall revert to this subject and present an epitome of the means employed in Japan to rear the larvæ of *S. cynthia*, and which may suggest something that we can profit by.

It appears, however, to us, a more patriotic as well as perhaps an easier experiment, to see what can be done with our native insects as silk-producers, while, from our limited observations, we think that *Telea polyphemus* and *Hyalophora cecropia* are the best suited to the purpose. A. R. GROTE.

Notice of an Egg-parasite upon the American Tent-Caterpillar, CLISIOCAMPA AMERICANA, Harris.

BY A. S. PACKARD, JR., M. D.

In August, 1863, I detected on the inner side of a bunch of eggs laid by the above mentioned species of moth, upon a twig of a young apple-tree, a minute Ichneumon fly, or Platygaster, which with the mass of eggs I put away for future examination. Upon opening the box a few days since for a further examination I find that several more of the parasites have appeared, and that nearly all the eggs are tenanted by these minute flies either in a chrysalis or perfect state, showing how much is done by these invaluable, as they are infinitesimal, friends of the farmer, in staying the undue increase of noxious insects.

This minute insect is only four one-hundredths of an inch in length. Its head is remarkably broad, being much wider than the rest of the body, and about one-third as long as broad. The eyes are small, remote; the antennæ are 14-jointed, long and slender, the second joint being long and slender, hardly thickened, and the joints composing the terminal half of the length are bead-like, being much rounder than those towards the base. The thorax is globular in front of the insertion of the wings, while the abdomen or hind-body is a little longer than the thorax, is broadest on the basal third, but is remarkably flattened from above downwards, suddenly terminating in an acute tip; being very flat above, while on the under side it is fuller and rounder; and when the wings are folded, as at rest, flat upon the back, the tip does not reach to their extremities. The color of the entire body is of a uniform black, the surface highly polished and slightly punctured. The shanks are blackish brown, becoming towards the tip very much paler; the tibiæ or second joint is of a pale brown, becoming still paler towards the tip, while the tarsal or foot-joints are at base of a very pale honey-yellow, and the terminal joints are rusty-brown. On the three terminal rings of the abdomen are a few scattered hairs; the ovipositor is slightly exserted, being long enough for the insect to bore through the egg-shell of the moth.

This belongs to a different genus from the species mentioned by Herrick and Harris as parasitic in the eggs of the Canker worm moth, since it differs in having a much longer and flatter abdomen, and longer and slenderer antennæ. But a more extended notice of its structure and affinities should not detain us here. The question with us now is, how much does it do in killing off, and thus restraining within proper limits, the injurious insect on which it preys. After seeing how many eggs of the Canker worm are destroyed by the minute fly which I have observed in very considerable numbers laying its eggs in those of the Canker worm late in autumn, we cannot easily overestimate the number of worms they destroy in embryo.

Having introduced and identified our new Lilliputian ally, what of the story of her life? In brief it seems thus. Late in June in New England (earlier, South), just as the moth has finished laying her eggs, numbers of our friendly flies appear and bore through the egg-shell of the moth to deposit within a tiny egg. The egg hatches, and the microscopic grub ensconces itself in a less vital part of the growing tent caterpillar, in the fatty matter on the back of the worm, and gradually exhausts the life of the caterpillar, so that it dies before being large enough to hatch. Upon opening the egg in the fall of the year, instead of the young caterpillar just ready to eat its way through the egg shell, we find our insect friend with its head in the largest end of the shell, which faces outward, and in the autumn a few hatch out. But it is probable that a larger number are born in the early summer. It was evident that the whole group of eggs were destroyed by these parasites, as no caterpillars hatched from them, since on opening the eggs the flies were found within, and many of the eggs were shrivelled up. Cannot some way be found to breed these minute parasites upon our injurious insects in large numbers in our orchards?

A correspondent from Bethlehem, Pa., writes that he has an English Elm (of fifteen years' growth and the only one in the city) that is infected with the larva of a small beetle during the months of May, June and July, eating the leaves and leaving nothing but the skeleton. He describes the larva as being about half an inch in length and hairy, and the perfect insect as a beetle, quarter of an inch in length, the wing-cases yellow, with black spots. As to methods of destroying the larvæ, he writes as follows:

"I noticed that in the month of July, the time of the transformation of this insect from the larva to the chrysalis state, they descend, creeping down the limbs and trunk of the tree. For the past few years I watched at this season and daily took a broom and brushed down all the larvæ to be seen; others, having come down previously, are found lying on the ground near the trunk. Gathering all together as much as possible, I took boiling water and scalded them to death. Not being always on the alert, some will naturally escape, and these propagate the mischief for the following season. This year I made an experiment in trapping the larvæ. I cut a band of tin about 2½ inches in width, to fit the trunk of the tree, encircling it at an angle of about 45 degrees. At the lowest point I made an opening with a short tube to fit into the mouth of a pickle jar. Along the outer edge of the projecting tin I made a ridge of fresh putty. The larvæ finding this tin obstruction in their way down the trunk, will follow its course to the lowest point, and drop into the jar or any vessel that may be attached for their reception. Insects generally, having an instinctive dislike for oil will be kept from creeping over the tin by the putty arrangement. This must be renewed as soon as the oil has dried off, but instead of renewing the putty, an application of oil to it will answer the same purpose. The jar I used I intended to hold at least five thousand, if not ten thousand, of these worms; it was filled in the course of twenty-four hours, on several successive days. How near I succeeded in getting all, the next season alone can demonstrate, but the arrangement as a trap was a success. I present my experience for what it may be worth; if there is any better remedy than the one I applied, I shall be pleased to hear from any of your correspondents."

Remarks.—From the description given of the larva—"about one-half inch in length and hairy"—it is impossible for us to say to what insect it belongs, but should judge it to be the larva of a moth; but our correspondent has evidently confounded his friends with those of his enemies, for, we believe, from the description and figure given of the "perfect insect," that it is a species of lady-bird (Coccinellidæ), and probably *Hippodamia convergens* Guér.—a friend and not a foe—and which no doubt fed upon a species of gall-producing Aphis, peculiar to the Elm. There is, however, a beetle (*Galeruca calmariensis*) that is very destructive to the Elms in Europe, the larva of which is said to be a "thick, cylindrical, blackish, six-footed grub," and sometimes so destructive as to wholly denude the Elms of their leaves. It has been introduced into this country, making its first appearance in the city of Baltimore some twenty-five years ago, where it played havoc with the Elms, entirely defoliating them. Dr. Brackenridge Clemens, of Easton, Pa., informs us that the Elms about that city are defoliated by a yellowish grub, spotted with black, each spot giving out a hair; he says that they are sometimes quite numerous, and descend from the tree to change to the chrysalis, which is also yellow; the perfect insect is a *beetle*, which, from the description he gave of it—obscure yellowish with a black stripe on each elyton or wing-case—seems to be the *Galeruca calmariensis*. We trust that if any of our readers have information concerning the larva referred to by the above correspondent, they will make it known through the columns of this Bulletin.—[Eds.

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◆

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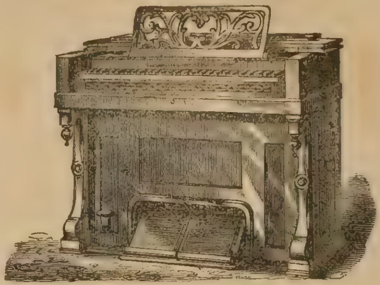

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Practical Entomologist.

A MONTHLY BULLETIN,

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The Practical Entomologist.

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E. T. CRESSON,
AUG. R. GROTE,
J. W. McALLISTER,
} Publication Committee and Editors.
BENJ. D. WALSH, Rock Island, Illinois,
Associate Editor.

PHILADELPHIA, DECEMBER 25, 1865.

A FEW WORDS ABOUT OUR PAPER.

We are compelled, because of the present limited size and number of pages of our Bulletin, to set most of this number in small type, in order to give as much reading matter as possible. We have plenty of information of much value to the Agriculturist, and we regret our inability, from the want of funds, to publish promptly all that is sent to us. We are sorry to say that the receipts derived from advertisements (our only source of income) are entirely insufficient even to defray the cost of publishing the small Paper we now issue. We had, on commencing, every cause to believe, that, by reason of the large circulation of the Bulletin, those doing business of interest to the Farmer and Agriculturist would patronize the advertising columns, and thereby assist us in establishing and maintaining the only periodical in this country devoted entirely to Practical Entomology. We shall go on, now that we have began, and crowd into the limited space all the information it will hold, at the same time asking the indulgence of our correspondents, promising to publish their articles in their turn, and to answer their inquiries as promptly as we can.

It is to be regretted that a work of this kind does not receive more encouragement than it does, for there is nothing so much needed by Agriculturists as information concerning the habits of Insects that are injurious to their crops of all kinds, with reliable remedies for their destruction. We could easily fill sixteen pages with such information every month, had we the necessary funds. Our greatest expense, of course, is paper; we have our own printing office, and we save much expense by doing our own type-setting and press-work. Before commencing to publish the Bulletin, we were urged to publish a monthly work either in pamphlet form or in a sheet of 16 quarto pages, and charge for it a regular subscription price, say $1 per annum; but having no means of raising a sufficient capital wherewith to start a publication upon such a scale, we concluded to adopt the plan we are now endeavoring to carry out, and to try, by a liberal system, to establish a publication having for its object the gratuitous diffusion of information of the greatest importance to the Agriculturists of our country, and one that will be within reach of the humblest Farmer. The demand for copies of the Bulletin is immense, and we shall do our best to supply it, but unless our receipts are increased in some way or another, we shall be compelled to limit the circulation. It is our determination to expend all of our income, however large the amount may be, upon the Paper, to improve its usefulness, and to enlarge its circulation. We derive no personal benefit whatever from its publication, but have undertaken it solely for the public good. We feel it our duty to make this plain statement of our condition, hoping that those interested in the undertaking will exert themselves towards establishing its permanency.

Contributions for this object are therefore solicited, and will be acknowledged in the number of the Bulletin succeeding the donation.

ANSWERS TO CORRESPONDENTS.

Levi Bartlett, N. H.—The larvæ of all known blister-beetles feed under ground on roots, &c. It is possible that some few of them may occasionally feed on the roots of the potato, but, from facts too tedious to particularize here, we do not believe they do. They certainly do not feed in the open air on the leaves of either the potato or any other plant, as does the larva of the Ten-striped Spearman. We find that you have made a very curious mistake. You have undoubtedly confounded the "Three-lined Leaf-beetle," (*Crioceris trilineata,*) which as you say, is well described and figured by Harris, (*Injurious Insects*, p. 118—9,) with the "four or six-striped Blister-beetle," (*Lytta vittata,*) which is the insect referred to by Mr. Walsh. If you turn to Harris's work, (pp. 137—9) you will find three different species of Blister-beetles well figured there—though the "four or six striped one" is not among the number—and you will notice that they are quite different in shape, &c., from the "three-lined leaf-beetle." The larva of the latter does commonly feed on potato leaves; that of the former never. Recollect that when an Entomologist says "four-striped" he means "four-striped" and not "three-striped." Entomologically speaking, the "three-lined Leaf-beetle," as well as the new Potato-bug from the Rocky Mountains, is separated at once from all the Blister-beetles by having only *four* joints to each of its six feet or *tarsi;* whereas the latter have their two hind feet *four*-jointed, but all their four front feet *five*-jointed.

Sanford Howard, Sec. Mich. State Board Agr.—You think that it is the common Army-worm, that is "said to have eaten the fall-sown wheat in some of the southern counties of Michigan." It cannot possibly be that insect, because it never appears in that latitude so late in the year in the larva or worm state. In South Illinois the Army-worm appears in May, in Maine in August, and at corresponding periods in intervening latitudes, always appearing a little later the further north you go. Are you certain that it was the moth of the Army-worm, and not some other brown-looking moth, that was so numerous with you last August? There is nothing at all improbable in the fact, but you may possibly have been deceived. Any eggs laid by the Army-worm Moth in August would remain unhatched till the following season.

We should recommend your farmers, whose corn has been so utterly ruined by the "white grub," (*Lachnosterna quercina,*, to turn in a drove of hogs to eat them up. It has been stated—we know not how truly—that meadows where this grub abounds have been saved by running a very heavy roller over them, sufficiently weighted to crush the soft body of the insect, though it does not injure the grass. The theory is not an improbable one, but it needs to be practically tested. Let some of your farmers do this and report the result to us.

S. W. Arnold, Ill.—1st. As to the Natural History of "the common horse-fly," there are two species of about the same size, one of which, with brownish eyes, is "the common horse-fly" of Northern Illinois, and the other, with emerald-green eyes, (whence it is popularly known as the "greenhead,") is "the common horse-fly" of Central Illinois. The former is scientifically designated as *Tabanus lineola;* the latter, we believe, as *Tabanus costalis.* The larva of neither of them is known, but a European species lives in the ground in the larva state, and Mr. Walsh bred a large-sized species from a larva which he ascertained to live in the water and to feed upon water-snails. We copy the following from Mr. Walsh's Paper on the subject in the *Proceedings of the Boston Society of Natural History*, that you may see the conclusions at which he arrives :—

"Several species of *Tabanus* are so prodigiously abundant in Illinois, in districts remote from any large streams or ponds, that they must evidently breed in the earth like DeGeer's species, not in the water like mine. There are prairies in Central Illinois, as I am credibly informed by numerous witnesses, across which it is impossible to ride or drive a horse in the heat of a summer's day on account of the *Tabanus.* * * * If, then, as appears from the above considerations, the larvæ of many, perhaps most, of our *Tabanus*, live in the ground; and if, as there is every reason to suppose, the larvæ of the terrestrial species are as carnivorous as I have shown those of the aquatic species to be, there can be little doubt, considering how numerous in individuals many of the species are, that they must destroy, during their larva life, innumerable noxious subterranean larvæ, *Melolonthidæ, Lyttidæ, Tipulidæ,* etc. They certainly cannot, at least in Illinois, feed habitually upon land-snails, for land-snails are quite scarce in that State. The scheme of the Creation is perfect and Nature is never at fault. It is only when Nature's system is but half understood, that we heedlessly complain of its imperfections. We blame the house-flies for annoying us, and fail to see that in the larva state they have cleared away impurities around our dwellings, which might otherwise have bred cholera and typhus fever. We execrate the blood-thirsty mosquito, and forget that in the larva state she has purified the water, which would otherwise, by its malarial effluvia, have generated agues and fevers. In all probability, when we rail at the *Tabanus* that torment our horses in the summer, we are railing at insects which, in the larva state, have added millions of dollars to the national wealth, by preying upon those most insiduous and unmanageable of all the insect-foes of the farmer—subterraneous, root-feeding larvæ."

2nd. As to the Natural History of the Mosquito:—All the male Mosquitoes and all the male Horse-flies (*Tabanus*) live exclusively upon the honey and pollen of flowers, and are physically incapable of drawing blood, owing to the imperfect structure of their mouths. The female Mosquitoes and the female Horse-flies prefer blood, if they can get it; otherwise they are reduced to feeding on the same substances as their less ferocious helpmates. The larvæ of the Mosquitoes live in stagnant water, and are popularly known as "Wiggle tails."

Before you undertake to kill off the larvæ of the Horse-flies and the Mosquitoes, you had best make yourself quite sure that they are really your enemies, and not, as Mr. Walsh maintains, some of your very best friends.

Rob't S. Redfield, Philadelphia.—The best way we know of killing large moths, is to puncture the under side of the body, between the thorax and the abdomen, with a steel pen dipped into strong *muriatic acid;* this method destroys immediately all muscular power, and is more satisfactory than anything we have ever used. Moths with very large bodies, especially females, should have the abdomen emptied of its contents and stuffed with raw cotton; the operation requires some care, and the incision should always be made on the under side. With all large moths it is best to insert a long pin lengthways through the abdomen into the thorax, to prevent the former from breaking off when dried. Call at the Hall of the Society, and we shall be happy to show you how we preserve our insects.

Mrs. Oren G. Nevins, Wisc.—It is impossible to tell from your description what the supposed insects in your hotbed are, or whether they are true insects at all. Those which you find on the bodies of many beetles, especially dung-beetles, are not true insects, all of which have in the perfect state *six* legs, but belong to the same class as the Spiders, Mites, &c., all of which have, throughout their whole existence, *eight* legs, never more and never less. You have very probably confounded together two entirely distinct animals. Send specimens of those found at large in your hot-bed, if you wish us to tell you what they are.

We had a hearty laugh over your verses, but we insert nothing in the PRACTICAL ENTOMOLOGIST but what is of practical, everyday utility.

M. S. Hill, East Liverpool, Ohio.—You say it will be "Locust-year" with you in 1866, and you state very correctly that "Locust-year" varies in different localities, but that, no matter when it comes, there is always, in the same locality, an interval of seventeen years between one "Locust-year" and that which precedes or follows it. You further suggest that "it would be interesting to have a notice of the particular year in which the seventeen-year locusts appear in the different parts of our country."

I incline to believe, that there are certain districts in the United States where this Insect is not to be found at all. I lived for twelve years in Henry county, Illinois, but found no "Locust-year" there. I then moved into Rock Island county, 30 miles Northwest, and although I have resided there fifteen years, there has been no "Locust-year" yet in my neighborhood. It is further observable that on Long Island, N. Y., a few straggling individuals may be met with every year. (Fitch, *N. Y. Rep.* II. § 14.)

We are indebted to Dr. Fitch for compiling, with much labor and from the best accessible sources, a statement of the different Locust districts in the United States. Errors, no doubt, there are some in this statement; but such as it is, it is a very valuable contribution to the Natural History of this remarkable insect, and correspondents of the PRACTICAL ENTOMOLOGIST may add greatly to its accuracy by forwarding a notice of when it is "Locust-year" with each of them. Here follows an abstract of Dr. Fitch's statement. (From *N. Y. Rep.* I. p. 39.)

LOCUST DISTRICTS OF THE UNITED STATES.

District 1*st.*—Valley of the Hudson River, N. Y. Northern limit, Schuylerville and Fort Miller; eastern limit, New Haven, Ct.; western limit, N. E. corner of Pennsylvania. Years 1843, 1860, 1877.

District 2*nd.*—Western New York, Western Pennsylvania and Eastern Ohio. Years 1849, 1866.

District 3*rd.*—Southeast Massachusetts, Long Island, N. Y., Chesapeake Bay, Valley of Susquehanna to Carlisle, Penna., Valley of Ohio from Kanawha Virg. to its mouth, thence to mouth of Mississippi and up Red River, Arkansas River, etc. Years 1855, 1872.

District 4*th.*—South Pennsylvania and Maryland, Virginia, North and South Carolina, and Georgia, and an outlying sub-district in Southeast Massachusetts. Years 1851, 1868.

District 5*th.*—From West Pennsylvania through the Valley of the Ohio River, and down that of the Mississippi to Louisiana. Years 1846, 1863, 1880. [This seems geographically mixed up with part of the 3rd district.]

District 6*th.*—Round the head of Lake Michigan eastern boundary middle of the State of Michigan; northern boundary Wisconsin; western boundary parts of Iowa; southern boundary Peoria, Ill., on Illinois River. Years 1854, 1871.

District 7*th.*—Western part of North Carolina. Years 1847, 1864, 1881.

District 8*th.*—Martha's Vineyard, Mass. Years 1833, 1850, 1867.

District 9*th.*—Connecticut River Valley, Mass. Years 1835, 1852, 1869.

Hence we see that it will be "Locust-year" somewhere or other within the limits of the United States in 1866, '67, '68 and '69, in 1871, '72 and '77, and in 1880 and '81. There may be, and probably are, other "Locust-years" in other districts; and in that case, it is desirable that I should be informed of the particular localities and the particular years.

It is important that we should not confound the Locusts of Scripture and of the Old World with the so-called Locusts of our Country. These last are more properly called "Cicadas," and species of them are found in Europe, and were well known to the ancient Greeks and Romans. Virgil speaks of the Cicadas "bursting the groves with their song," and a graceless Greek poet wrote as follows, alluding to the fact that it is only the *male* Cicada that sings:—

> Happy the Cicadas lives,
> Since they all have voiceless wives!

The Locusts that "devoured every green thing throughout the land of Egypt," were species of what we popularly call Grasshoppers—the same group of insects that have repeatedly "devoured every green thing" in California, Utah, Colorado, Nebraska and Minnesota. Our so-called "locusts" could not possibly do this; for they have no jaws at all to eat herbage with, and only a beak to suck a little sap with now and then. The few twigs that they do really destroy, are destroyed, not by their jaws, for they have none, but by the female boring into them with her ovipositor to find a suitable nest for her eggs. The stories of their stinging people to death with this ovipositor are probably all moonshine. I have handled dozens of them, and never got stung yet; and even if they did accidentally pierce the skin with it, it would be no worse and no better than the prick of a pin, for they have no poison-bag in their tails as the Bees and Wasps have.

It is, indeed, possible, that persons in a peculiarly irritable habit of body might die from such a wound; and so have many died from bee-stings, and some even from the prick of a pin. But that does not prove that pins are dangerous and deadly weapons, not to be lightly placed in the hands of women and children. The only insects that any one really need be afraid of are the various species of Bees and Wasps; and even of these, it is only the *females* that have stings. Drones, which are the male bees, are, as everybody knows, very peaceable, well-behaved citizens, and, unlike their formidable wives, may be handled by any one with impunity. B. D. W.

Mrs. E. Barney, N. Y.—We shall publish in our next number an illustrated article on "Borers" of various kinds, by Mr. Walsh of Illinois, in which you will find your suggestions attended to.

Peter Chance, Ohio.—The Philadelphia Raspberry can be had of H. A. Dreer, 714 Chestnut street, Philadelphia. It is said to be the most profitable market berry that is cultivated; fruit large and good; plant very hardy and *incredibly* productive.

G. W. H., Ohio, wishes to know the best work on Fruit Growing, for a new beginner. Will some of our correspondents give the desired information? We do not profess to be posted up on that subject.

CORRESPONDENCE.

EDS. PRACTICAL ENTOMOLOGIST:—The first two numbers of your "BULLETIN" have come to hand, and I find considerable matter of interest in them. It is to be hoped the enterprize may succeed, because through such an agency much truth and many facts in regard to Entomology can be disseminated among those who will be most benefitted by them.

While reading your well printed columns, I feel the symptoms of a *slight* attack of *cacoethes scrib.*, and yielding to the power, I let my pen run on in a desultory style, and have only to say if you find anything worth using in these jottings, you are at liberty to "cut and come again."

The article of my friend P. on the parasite of the tent-caterpillar reminds me of a little experience of my own in that direction. Here let me remark that I make no pretensions to being an Entomologist, as I have only "just entered the gate," and have studied the subject in but few of its points, and those in only a brief and practical manner. Hence, whatever mistakes in style or "*Latinity*" I may make, will be excused. But to the point. In 1862 I discovered a parasite of the tent-caterpillar which I had never seen noticed, and of which I then deferred a description until I learned further in regard to it. But the subject had passed from my mind until I saw the above-noticed article, which recalls it. In the box of specimens (in vials) which I send you, No. 1 contains the Ichneumon which I took from the pupa case of the *Clisiocampa Americana*. I found but one other specimen, and that was not fully matured. What is your opinion? Is it figured and described, and what is its name?[*] The egg must be laid in or on the larva, and hatching and growing with it does not prevent the caterpillar from entering the chrysalis state, but then grows and appropriates the whole shell in which it passes through its own changes until it is a perfect insect, as I found it. No. 2 contains another Ichneumon, which acts upon the same principle. It is the geometer which preys on the common woodbine. The vial contains the larva and the pupa of the moth, and also the imago of the parasite. I found, on examination, that about one-third of these pupa cases were filled and appropriated by the Ichneumon. Please break two or three of these pupa cases, and perhaps you will find a specimen of both. Can you give me their names?[†]

These Ichneumons are the farmers' friends, as they prey upon and destroy those of their own kind which are destructive. If we can find an ally in the parasite referred to above as living on the tent-caterpillar, it deserves to be known and doubly welcomed, for at the rate they destroyed our fruit and ravaged our orchards this year, we shall soon require assistance of some kind, else raising apple trees must be given up.

No. 3 contains a kind of beetle which lives on the apple tree here, and which I discovered in 1862. I have never seen it referred to or named. I published a description of it at the time. Can you name it?[‡] GEO. E. BRACKETT.

BELFAST, ME., Nov. 29, 1865.

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[*] *Pimpla conquisitor*, Say. Described, but not figured.

[†] *Ichneumon lætus*, Brullé. Don't know the name of the "Geometer." Send us specimens of the moth.

[‡] *Leptostylus macula*, Say. [EDS

The Onion-fly—A Remedy.

(FROM A LETTER BY LEVI BARTLETT, N. H.)

The "Black Onion-fly," spoken of by Mr. Shimer, has been so injurious to the onion in this section for a number of years past, that its cultivation has been nearly given up. But a farmer, living about a mile from my place, has raised for the three past seasons splendid crops. He destroys the maggot, by pouring a small stream of boiling water along the drills near the roots of the plants. His theory is, that the ground is sufficiently heated to destroy the tender maggot, but not warm enough to injure the onion plant. He goes over the onion bed four times during the season. This year he grew forty-two bushels of superb onions on ten square rods of land. I do not say the hot water killed the maggot, but I do say his onions, like those of other people's, are attacked by the maggot, but they suffer no injury from them, while others lose their crops that do not practice this scalding process.

Remarks.—There is authentic proof that the larva of the Peach-tree Borer may be destroyed on the same principle, by hot water, without injuring the tree. Vegetable organisms will often stand, without damage, a degree of heat that would be destructive to animal organisms. For example, every one knows that Locust seed grows all the better for being scalded; whereas we are satisfied, from long experience, that there is no insect that can survive immersion for a few minutes in water, that is too hot to hold one's finger in it for a second or two. In the *New York Tribune* there was published, some years ago, a letter from Dr. O. W. Drew, of Waterbury, Vt., in which he states that for many years the onion crop had been entirely destroyed in central Vermont by the Onion Maggot; that "many experiments had been tried with lime, salt, ashes and plaster without benefit;" and that he himself, finding his own plants infested in the usual manner, "had, when they were about four inches high, poured a full stream of boiling water from a large tea-kettle directly upon each row, and repeated the application." The result, as he adds, was, that "the plants looked as bright and trim as after a May shower; that he lost no more of them; and that for the first time in ten years' experience, he had as fine a crop of onions as was ever seen."—EDS.

The White Pine Weevil—Rhynchœnus Strobi, Peck.

This insect, first described by Prof. Peck, has been re-described by Dr. Harris, (*Injurious Insects*, page 72, Ed. 1861), also by Dr. Fitch, (*Rep.* Vol. 2, No. 255). It is very common in this section (Waterbury, Ct.), and is doing great injury—not so much to the white pine, which is not abundant, and generally so small here as to be of little value as a timber tree—but to the Norway spruce, which has, within a few years past, been planted, in vast numbers, in yards, lawns and cemeteries, and which it seems to prefer to the native pine.

The leading shoot of this rapidly growing ornamental tree is often seen to wither and die in midsummer, and it is known to every close observer that a grub causes this decay—the larva of the *Rhynchœnus Strobi.*

I have nothing to add to what Dr. Harris and Dr. Fitch have written relating to its history, but would call attention to a statement that both these writers have made, viz: that its ravages may be successfully checked by simply removing and burning the diseased shoots. This should be done in June or July, while the weevil is in the larva state, and if persevered in, will rid the spruce of the only formidable enemy it has, at least in those sections where the white pine is not abundant.

Passing through the new cemetery in the village of Thomaston, Ct. a few days since, I noticed that of sixty trees, at least twenty-five had had the leading shoot destroyed the past summer, and only five or six had entirely escaped the attacks of the weevil. A gentleman remarked to me that these spruces were not *hardy*, that they *winter-killed.*

Our own Riverside cemetery has suffered severely, and not only are uninjured trees rare, but many are reduced to scraggy evergreen clumps, having lost the beautiful symmetry for which this tree is so remarkable, and for which it is chiefly prized. The gardener of the Riverside grounds remarked to me to-day that the work of the *worms* was a real advantage to the trees, as it kept them down, and caused them to *thicken up.* The unsightly appearance of many of them makes it desirable, I think, that this pollarding should be performed by a more skillful workman than the weevil.

It is, to say the least, a singular taste that crops or trims, or in any way mutilates this noble species of evergreen, and such a taste would no doubt be gratified could it transform an eagle into a Shanghai chicken.

This weevil is evidently on the increase here, and no wonder, for, from thirty to fifty larvæ are often found in a single tree. Parasitic insects destroy many of the larvæ, but the work can only be fully accomplished by our aiding them in the way suggested.

Dr. Harris' description of the perfect insect or beetle is as follows:—

"Oblong oval, rather slender, of a brownish color, thickly punctured, and variegated with small brown, rust-colored, and whitish scales. There are two white dots on the thorax; the scutel white; and on the wing-covers, which are punctured in rows, there is a whitish transverse band behind the middle. The snout is longer than the thorax, slender, and a very little inclined. The length, exclusive of the snout, varies from one-fifth to three-tenths of an inch." H. F. BASSETT.

WATERBURY, CONN., Nov. 3d, 1865.

The "Thrips" of the Vine-growers.—What is it?

BY BENJ. D. WALSH.

In one of Mr. Meeker's excellent letters, recently published in the New York *Tribune*, I notice the following passage:

> The grapes in this region [Alton, South Illinois] lost their leaves through the ravages of the Thrips. This is a very small insect, appearing in immense numbers; it eats the leaves till they appear like shreds; the leaves of the Concord are too rough and hard for its teeth. The vines being bare, the birds easily find the grapes. It seems to me that the real enemy is not so much the birds as the Thrips. It is a question whether what is called the leaf blight at Cleveland and elsewhere is not the Thrips. Dr. Hall thinks there is a remedy in having a garden engine, by which the leaves will be drenched with a solution of soap, tobacco, and a little sulphur. One can go over an acre in a short time. The engine will cost $35.—*Semiweekly N. Y. Tribune*, Nov. 17, 1865.

It is probably to this insect that Dr. Warder refers, when he asks in the first number of the PRACTICAL ENTOMOLOGIST, "Is our *Thrips* in the vineyards the *Tettigonia vitis* of Harris?" If Mr. Meeker's statement be correct, that "it *eats* the leaves till they appear like shreds," it certainly cannot be that insect, or any other belonging to that Order, *Homoptera.* For all of these have no jaws to eat with, but only a beak to suck sap with. I am at a loss to conjecture what it can be, unless it is the larva of some minute moth, or flea-beetle (*Haltica.*) A species of these last—the *chalybea* of Illiger—has been long known to infest the vine, but it attacks the young buds more than the leaves, and it would scarcely be called a "very small insect," being about three-sixteenths of an inch long.

Some years ago, specimens of vine-leaves were sent to me from Missouri, covered all over with small, brown, dead spots, which had been caused by the *Tettigonia vitis*, and one or two other species belonging to the same genus; and it was stated that these insects had in this manner utterly ruined many vines in that State. But there is a wide difference between brown spots and holes in a leaf.

I do not believe that the true *Thrips* of entomologists are, as has hitherto been universally believed, vegetable feeders; but that on the contrary, they are cannibal insects, preying upon injurious larvæ, and therefore the friends and not the foes of the Agriculturist. The curious reader will find my reasons for this belief in the Proceedings of the Entomological Society, (III. pp. 611—613). But it is possible that I may be wrong, and that the vine-growers are right. In any case it is highly desirable that specimens of this foe to the vine be forwarded to the Society, that it may be determined who and what he is. Until that is done, we are only groping in the dark. Because an insect is popularly called a *Thrips*, it by no means follows that it is really a *Thrips*. Farmers very generally call all Beetles "Bugs." And yet, although every Farmer in the United States should persist in calling Beetles "Bugs" till the year 1900, still that will not make them Bugs.

Let me impress once more upon the minds of the Farmers, that when they send specimens they should enclose them in a stout paste-board box—a gun-cap box for example—and put in enough cotton-wool or some other such substance, to prevent their rattling themselves to pieces in Uncle Sam's mail-bags. For lack of these precautions, I have often received specimens pressed as flat as a pancake or broken into a hundred pieces. A farmer would stare, if he was asked to determine the particular variety of wheat—whether Mediterranean, or Tea, or Club, or whatever else it might be—from examining a handful of bran. An orchardist would smile, if he was asked to determine the particular variety of Peach, from inspecting a sack of the dried fruit. And yet they often expect Entomologists to decide, from inspecting a mass of shapeless fragments, to which of the 30,000 species of insects, that inhabit the United States, those shapeless fragments formerly appertained.

Rock Island, Ill., Nov. 21, 1865.

The Wooly Apple-tree Blight.—Eriosoma lanigera, Harris.

Dr. Harris, in his account of this insect says, on the authority of Hausmann and Knapp, that it never acquires wings, and supposes that it spreads from tree to tree by being blown by the winds, the long tufts of downy matter attached to its body forming a sort of parachute. Mr. Walsh, in an excellent article on plant-lice, (*Proc. Ent. Soc. Phil.* Vol. 1, p. 303) also alludes to the uncertainty in regard to its having wings at any time, and their structure; for although Westwood attributes wings to the genus, his description does not apply to the wings of closely allied species, nor, as I have been able to ascertain, to this species, which is the type of the genus. Mr. Walsh, however, describes the wings of a wooly plant-louse, inhabiting mushrooms, and Mr. Fitch several species inhabiting various trees, all of which acquire wings at certain times, having similar structure to the wings of the apple-tree wooly-louse.

The importance of ascertaining definitely whether the females of noxious insects are winged or not, must be sufficiently apparent to every one, since their manner of increase and diffusion depends directly upon this point, and our remedies must be modified accordingly. This is well illustrated by the differences in the habits of two of our worst insects, and the remedies suitable to be applied to them. The Canker-worm has a wingless female which is obliged to crawl up the tree or fence nearest her place of birth to deposit her eggs, while the Tent-Caterpillar having, when mature, both females and males furnished with strong wings, the females are able to place their large clusters of eggs on any trees they may reach by flight, thus spreading much more rapidly.

It gives me pleasure, therefore, to be able to determine this point in the present instance. Having frequently examined a small apple-tree badly infested by this insect, both on the main stem and branches, during the past autumn, I found, about the middle of October, among the wingless neuters (or budding individuals), a large number of both males and females having well formed and rather large wings, but in other respects closely resembling the rest, except that they had but little of the downy substance on their bodies, which were nearly black and rather plump. The fore wings were large and had three discal veins, the third one forked near the middle and scarcely visible near its base before forking. The stigma or colored spot was about three times as long as broad, and acute at each end. The hind wings were about half as long as the others, and quite narrow, with two simple discal veins.

It is evident, therefore, that this species agrees with others of the genus both in structure and habits, and that the winged females appearing late in the fall are able to fly from tree to tree in order to deposit her eggs for another generation to be hatched the next spring, thus providing for the rapid increase and diffusion of this pest. This fact should cause all fruit growers to take particular pains to destroy these lice wherever found, for the colony that is this year allowed to increase upon some worthless tree or the shoots and suckers from its base, will furnish the winged mothers of countless myriads that may infest the most choice trees next year.

Another point that I do not remember to have seen mentioned in the history of this insect is its remarkable power of enduring the cold of winter and severe storms of rain and snow with comparative impunity. The small tree already alluded to is still (Dec. 11) covered along the under sides of all the branches with healthy and active lice of all sizes, busily engaged in sucking its sap, although we have had two snow storms and many cold rains and freezing nights. Doubtless many of these insects will thus survive the winter, especially when in the crevices and wounded places where they delight to establish themselves. The downy or cottony substance that usually covers them abundantly is often nearly all removed by wind and rain, but another supply is rapidly produced. This may serve to protect them, in some degree, from cold as well as from the summer heat. That this species may thus survive the winter is the more probable since I have observed another allied species living upon the red-alder at various times throughout the winter in Maine, even upon the exposed surfaces of the trunk and branches.

A. E. VERRILL.

New Haven, Conn., Dec. 11, 1865.

Notes on Insects infesting the Currant and Gooseberry.

To those who pay any attention to the cultivation of the Currant and Gooseberry, the following notes may prove both serviceable and interesting.

We do not pretend to give here any new information concerning the depredations of these insects, nor to suggest any new remedies for their destruction, for since the publication of Harris' and Fitch's works on Noxious Insects, little or nothing has been published on this sadly neglected subject. Perhaps not one Farmer in five hundred has had the opportunity of reading the writings of either Harris or Fitch, while the PRACTICAL ENTOMOLOGIST is within reach of the humblest Farmer, and the information given in its pages will be more widely circulated, and consequently prove more useful. For these reasons, the following notes have been compiled for publication in this Bulletin.

§.—*Affecting the stalks.*

THE AMERICAN CURRANT BORER.—*Psenocerus supernotatus* Say.

The larva of this insect is a small, cylindrical, white, footless grub, with the head brown and the jaws black. It feeds upon the pith of the stalks, and therefore killing them. It passes its pupa state in the stalks, and in the latter part of May or beginning of June changes to a small, narrow, cylindrical, brownish beetle, darker behind the middle, with a whitish dot a little before the middle of each wing-case. and a large, slightly oblique mark of the same color just behind the middle; the horns or antennæ are slender and nearly as long as the body.

Dr. Fitch, who has written considerably about this insect in his Reports to the New York State Agricultural Society, says:

> "In all our gardens numbers of the currant stalks perish every season. To such an extent does this mortality prevail, that this fruit would soon disappear from our country were it not that the roots of this shrub are so vigorous, sending up a multitude of new shoots every year, whereby the places of those that perish are constantly re-supplied.
>
> "After the leaves have fallen in the autumn and during the winter, these dead stalks are readily distinguished from the live ones by being dotted over with a pretty little fungus the size of a pin head, and of a pale bright red color and a corky texture."—(*Third Report*, § 134.)

The parasite of the Currant borer, whether of this or the European borer, it is not yet satisfactorily ascertained, is a small Ichneumon-fly, about one-tenth of an inch in length, black, with the legs, the fore-breast and base of the abdomen, yellowish.

As to the most reliable method of destroying the Currant borer, we can do no better than to quote the words of Dr. Fitch, which are as follows:

> "We have only to state in conclusion that the utter carelessness with which the currant is treated in most of our gardens, with a thicket of young shoots annually left unpruned and crowding upon and smothering each other, gives these borers and other pernicious insects the utmost facilities for lurking unmolested and pursuing their devastating work without interruption. Were this shrub suituably trimmed and kept thinned out to only three or four stalks from each root, these stalks growing freely exposed to the light and air, would be little if any infested by these depredating insects.
>
> "As these worms remain in the dead stalks through the winter, their destruction is easily effected. By breaking off all the dead brittle stalks at the surface of the ground and burning them, these borers may at once be exterminated from the garden. But they will soon find their way back again unless the bushes are well pruned every year."—(*Ibid.*)

THE EUROPEAN CURRANT BORER (*Trochilium tipuliforme* Linn.) is an insect which destroys our Currant bushes in the same manner as the American borer, but instead of the perfect insect being a beetle, it is a small black wasp-like moth, with three narrow yellow bands on the abdomen; the wings are transparent, margined with black and tipped with copper-color. The larva is a small, whitish grub, with a darker line down the middle of its back, and with the head and legs brown; it changes to pupa within the stalk, and appears a perfect insect the fore part of June.

The same remedy suggested for the American borer is applicable to this insect, both having similar habits.

About the last of May, the young stalks of the Currant are sometimes severed by a cut-worm, about 1½ inch long, of a shining bluish-brown color, with faint dots regularly arranged, each bearing a short fine hair; the head is reddish-brown, as well as a spot on the neck and another on top of the last segment. In June it enters the ground, and the perfect insect, a rather large moth, appears during July. Dr. Fitch has named it the "Amputating brocade moth,—*Hadena amputatrix*," but was previously described by Boisduval as *Mamestra arctica;* it is mentioned in Harris (*Inj. Ins.*) as *Hadena amica*. The anterior wings, above, are blackish, varied with reddish-brown and cinereous, with a broad, submarginal, oblique, ashen-gray band, and a spot of the same color a little beyond the middle near the anterior margin; the posterior wings are silky-greyish, with a broad dusky band behind, as well as a dusky spot above the middle of each wing, much more distinct on the under side; the body is pale reddish-brown, with dorsal and apical tufts.

There are three species of Bark lice mentioned by Dr. Fitch (*Third Report*, pp. 108 and 109) as being found upon the bark of the Currant stalks; the first a minute oyster-shaped scale (the "Apple bark-louse, *Aspidiotus conchiformis*"), more common upon the Apple; the second a minute flat, circular scale (the "Circular bark-louse, *Aspidiotus circularis*") "being of the same blackish-brown hue with the surrounding bark, and having in the centre a smooth, round, wart-like elevation, of a pale yellow color;" and the third a hemispherical scale (the "Currant bark-louse, *Lecanium ribis*"), of a brownish-yellow color, with its margins finely and transversely wrinkled. These minute depredators are often very numerous, sometimes crowded together in such numbers as to wholly cover the bark, which they puncture with their little beaks and suck out its juices. They belong to the suborder HOMOPTERA, family COCCIDÆ, to which the Cochineal insect, so highly prized as a material for dyeing, also belongs.

§§.—*Affecting the leaves.*

THE AMERICAN CURRANT MOTH.—*Ellopia ribearia* (Walker)=*Abraxas? ribearia*, Fitch.

This is a very destructive insect to the Currant in this country. It is a long, cylindrical, yellow measure or spaw-worm, varied on the sides with white, and with numerous black spots regularly arranged; from each spot or dot proceeds a black hair; it is found eating the leaves of the Currant, as well as the Gooseberry, from the middle of May to the middle of June, sometimes stripping the bushes entirely naked. The worms descend to the ground, and burying themselves slightly beneath the surface, change to the pupa state; the pupæ are of a shining black color, about half an inch long, and are easily detected; they may be found in abundance in the earth, immediately beneath the defoliated Currant and Gooseberry bushes, about the middle or last of June. The perfect insect is a pale yellowish moth, the wings with several more or less dusky spots, sometimes arranged into one or two irregular bands across the wings.

Dr. Fitch has described and figured this insect in its different stages, in the Transactions of the New York State Agricultural Society, Vol. 7, where he gives much interesting information concerning its habits, and suggestions for its extermination. On this latter subject Dr. Fitch says:

"This Insect is so closely related to the Gooseberry-moth of Europe, that we may confidently infer, that those measures only which have been found efficacious for checking the ravages of that species, can be of material avail against this. Numerous remedies have there been resorted to, such as sifting the fine dust of soot, of ashes, &c., repeatedly over the bushes: sprinkling with lime-water, or with decoctions of tobacco, of fox-glove, of elder, &c.; by successive shakes of the bushes, causing all the worms to descend to the ground, and then lying cabbage-leaves around the base of the stalks, over which, it was reported, the worms would not crawl to re-ascend. But none of these remedies have established themselves in public favor; and the only measure which is recommended with confidence, by all the more intelligent writers, is that of 'hand-picking,' as it is termed. This, though tedious, is said to be, in the end, the most economical of any measure known, and the only one on which full reliance can be placed. It is commonly accomplished by suddenly jarring the bush, and then with a forked stick or some similar implement, gathering those worms that have let themselves down by threads, and crushing them beneath the foot. This process requires to be repeated three or four times to free a bush from these worms, as but part of them let themselves down on the first agitation.

"This remedy should be resorted to with our insect as soon as the young worms are discovered upon the bushes, and if perseveringly followed up, will, no doubt, be effectual. The task, however, will be a formidable one, to thus free a garden of countless numbers of these larvæ by which it is infested; and the measure can only be resorted to with facility in those gardens where the bushes are kept well thinned by pruning.

"A less laborious mode of reducing the numbers of our moth, in badly infested gardens, it strikes me is so feasible, that some may be disposed to test its efficacy by giving it a trial. As already stated, the worms having completed their growth, bury themselves slightly in the ground under the bushes, where they lie several days in their pupa state, and then the winged moths come from these pupæ and make their way out of the ground. Now if the surface of the earth beneath Currant and Gooseberry bushes be carefully levelled and made smooth with a rake, it will be but a slight labor, when the worms have mostly left the bushes and buried themselves, to closely cover the ground beneath and around the bushes with boards, or pave it with bricks, should these be at hand, allowing this covering to remain three or four weeks. The winged moths, on coming from their pupa shells, would probably then be unable to make their way into the air, and would perish in their confinement. The efficacy of this measure would be indicated, on removing the boards, by the numbers of dead moths on the surface of the ground beneath them."

There is another worm which is said to be very destructive to the Currant and Gooseberry bushes, and which does not seem to have been mentioned by either Harris or Fitch. We copy the following account of this insect, given by Mr. Otis Bigelow of Onondago Co., N. Y., in the *American Agriculturist* for May 1865, p. 141:—

"About three years since, people in this vicinity were surprised to find their Currant and Gooseberry bushes suddenly deprived of their leaves. On examination we found the bushes covered with a myriad of green worms, speckled with black spots on the back and sides, and about three-quarters of an inch long when full grown. As soon as the leaves start in the Spring, a fly appears and lays its eggs along the stems on the under side of the leaf, or some of the leaves in the middle of the bush; these soon hatch and devour all the leaves clean, for about a week, when they change their skins to a pale green, and falling to the ground, disappear. By sifting the earth under the bushes, they will be found enclosed in little balls of it. In three weeks they come out as flies; the size of a common fly, which they nearly resemble, excepting that they are more slim and have a yellow abdomen. The reproduction of these worms is continued until all the leaves are destroyed. REMEDY.—Dig up all the bushes that cannot be personally attended, and trim the remainder so as to leave them open and accessible. Visit them at least once every day. Look for leaves with little holes in them. The little holes indicate the presence of the newly hatched worms, which are not seen unless the leaf is turned up, as they always begin on the under side. By destroying four or five leaves on each bush per day the whole may be saved, as only a few leaves are selected by the fly to deposit her eggs. The worms never touch the fruit, and the stripping of the leaves does not prevent a new growth the same season, but these will no sooner appear than they are destroyed."

This worm is the larva of a Hymenopterous insect, *Selandria Ribis* of Prof. A. Winchell, who published an account of its history in the Detroit *Free Press* of July 9th, 1864; the same article is published, in a condensed form, in Silliman's American Journal of Science and Arts, September, 1864, p. 291. We shall publish, in a subsequent number of the BULLETIN, a detailed history of this destructive insect, by a correspondent who is now gathering the necessary information.

§§§.—*Affecting the fruit.*

Dr. Fitch (*ibid.*) mentions two insects which attack the fruit of the Gooseberry, viz: the "Gooseberry Moth" and the "Gooseberry Midge." The first, in its larval state, is a "slender greenish worm, about half an inch long, with a dark colored nose, a dark band across the top of its neck, and the three forward pairs of feet of the same color, which forms a tube of silken threads from the cavity in the berry through a hole in its side to an adjacent leaf, through which it crawls out and in." The fruit, when about half grown, perishes, its interior being ate out by the worm. So far as known, this insect has not been obtained in its perfect or "moth" state, but Dr. Fitch supposes it to belong to *Tineidæ*, a family of Micro-Lepidoptera, or small moths.

The "Gooseberry Midge" (*Cecidomyia grossulariæ*, Fitch) is a minute, yellowish, two-winged fly, somewhat resembling a mosquito. The perfect insect punctures the young fruit of the Gooseberry, and deposits its tiny eggs therein; these eggs develop into minute, bright yellow maggots, which cause the fruit to have a prematurely ripe appearance, turning red and dropping off.

As a remedy against these insects, Dr. Fitch suggests the following:—"All fruit upon the Gooseberry bushes which is found prematurely decaying and assuming a ripened appearance, and all which falls to the ground, should be gathered and thrown into the fire, to destroy the worms which the berries contain. By attention to this measure the haunts of this insect in the garden can be easily broken up, whereas, if this step is neglected the evil will be liable to continue year after year. As this insect breeds equally well in the wild Gooseberries, we cannot hope to exterminate it from our country. But none of these wild Gooseberries should be permitted to grow in the vicinity of the gardens, for from them, if near, this midge will continually be finding its way to the bushes of the cultivated Gooseberry." (*First Report*, p. 176.)

☞ Those of our Western readers who have information to communicate for publication in the BULLETIN, will please forward it as early in the month as possible, to BENJ. D. WALSH, Esq., Rock Island, Ill.

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J. W. McALLISTER,
Publication Committee and Editors.
BENJ. D. WALSH, Rock Island, Illinois,
Associate Editor.

PHILADELPHIA, JANUARY 29, 1866.

☞ We publish in this number a lengthy, but valuable, article on "Borers," by Mr. Walsh, of Illinois, which we hope will be carefully read by all who subscribe to this little Paper. Being desirous of printing the whole of the article in this number, our answers to correspondents and several short communications have been crowded out, and will be given in our next number. Since our last issue we have received much to encourage us in the publication of the Bulletin, and although advertisements continue to come in slowly, we have cause to believe that they will steadily increase, and finally produce a sufficient income to enable us to furnish the Bulletin to subscribers upon the same terms as we do now. In the meantime we respectfully ask those who consider the Practical Entomologist worthy of support, to send us contributions in money for that purpose. The increase in the circulation of the Bulletin averages 30 daily, or about 900 monthly. Copies are sent to every State in the Union, with the exception of some of the Southern States, where its publication is not known; and we think the medium thus offered to advertisers doing business with Farmers and Agriculturists is certainly very good; we hope, therefore, that they will patronize our advertising columns, and we will engage to do our best to give satisfaction both as to terms and display. We tender our sincere thanks to the Agricultural and other journals in different parts of the United States, for the good words published by them in behalf of this little paper, and which greatly encourages its publication.

BORERS.

BY BENJ. D. WALSH, M. A.

We continually see men writing and talking about "*the* Borer," and expounding at great length some pet scheme that they have devised for getting rid of "*the* Borer!" They might just as well publish prolix dissertations about the habits and the requirements of "Stock," and recommend at great length some particular method of feeding "Stock." Just as there are a great many kinds of "Stock" kept by a farmer—for example, Horses, Horned Cattle, Sheep, Hogs, &c.—and just as a Cow will feed upon hay while a Hog will starve on it, and contrariwise a Hog will feed upon butcher's offal which a Cow will starve on; so there are a great many different kinds of "Borers," each confined to one or more particular kinds of tree, and each requiring to be attacked in a particular manner, in order to prevent his working mischief. A remedy that is effectual against one kind of Borer will often, as I know from personal experience, be perfectly useless against another kind. For in Natural History, however it may be in Cookery, what is sauce for goose is not always sauce for gander.

The number of the different species of "Borers," found within the limits of the United States, amounts to many hundreds; but as only a few of these are brought more immediately into contact with the Farmer, from their attacking such trees and shrubs, as are peculiarly useful to him either for their shade or their timber, or such as are cultivated for their fruit, I merely propose in the following paragraphs to give a brief account of each of these few. At the same time, the best method of counterworking each species will be explained, so far as known to me; and even when no certain and effectual remedy can be suggested, a knowledge of the habits of the insect will often lead the intelligent Farmer to discover a remedy for himself.

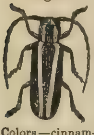
The reason why so many men suppose, that all "Borers" are one and the same thing and belong to one and the same species is, that they generally know them only in the *larva* or *grub* state, which, as a general rule, is the state in which they do the mischief. Now, it is almost always the case, that larvæ resemble one another much more closely than the perfect insects do. We observe a very similar thing in the human species. Take a thousand babies, and you will find scores of them that are so nearly alike, that you cannot tell which is which. Take a thousand grown men, and probably there will not be two out of the thousand, that cannot be readily distinguished one from the other. Just as the grub that you find in your fruit-trees is the larva of the perfect insect, so is the baby the larva of the adult man. If the reader will cast his eye over the eight engravings given with this article, he will have no difficulty in perceiving, that each of them represents a different kind or species of insect, although none of them are colored to the life. All these eight figures represent Borers of different kinds, in their perfect or winged state. If equally good figures had been given of the larvæ, that produce these eight kinds of borers, it would take an Entomologist to see any difference between them, unless perhaps in the case of one or two of them.

We perceive by this time that it is no use to talk about "Borers" generally, without specifying the particular kind of Borer to which you refer. In many cases it is not even enough to specify the particular kind of tree that they attack; for although there is but one kind of Borer that commonly attacks the Peach-tree, yet there are no less than three kinds that commonly attack the Apple-tree, two of which are about equally destructive and equally common, though one kind occurs more frequently in one section of the country and the other in another section. And now, having cleared the ground before us, we will take up in succession the eight kinds of Borers whose Natural History I propose to elucidate. The reader will please to bear in mind, that in each case it is the Perfect Insect only, and not the larva or grub, that is figured.

The two-striped Borer. (*Saperda bivittata* Say.)

On Apple, Pear and Quince.

Fig. 1.



Colors—cinnamon brown and white.

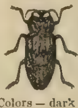
The larva of this Beetle, which commonly infests the Apple-tree, is of a whitish color, about an inch or so long when full-grown, and about the thickness of a goose-quill, and nearly as round as a goose-quill. As is the case with almost all Borers, the perfect female insect deposits her egg upon the bark, or among the chinks and cracks of the bark; and the young larva soon afterwards hatches out and mines its way in by a hole so minute that it soon closes up. Consequently the holes that we see in our trees are not made by the larva in getting into the tree, but are either opened by him, when he is about half-grown, in order to get rid of his "castings" or excrement, or are made by him, when he is full-grown, to afford a passage for the winged insect. In early life he confines himself entirely to the sapwood, and it is at that period that the greatest damage is done, young trees, when they contain several borers, being often completely girdled by them. As he approaches maturity, the larva strikes off into the heart-wood, which of course is, comparatively speaking, but slightly injurious to the tree. The perfect insect comes out some time in June in the latitude of New York, when they couple and the female shortly afterwards lays her eggs. North and South of New York it doubtless comes out a little later or a little earlier. The larva is two years and perhaps longer in arriving at maturity, so that an egg laid in 1866 will not reproduce the perfect beetle until at least 1868. The insect is remarkable for generally confining itself to the butt of the trunk, and by looking there carefully, the holes through which it throws out its castings may often be discovered, by the little piles of sawdust-like matter that lie on the ground immediately under them. In such cases, the best and only effectual remedy is the knife. Very rarely the larva is found in the crotch of the tree.

For an effectual mode of preserving Apple-trees from the attacks of this Borer, and also for the way to distinguish him from the following kind, see under that kind. Besides Apple-trees, he sometimes attacks Pear-trees, and he is death upon Quince-trees.

The Buprestis Borer. (*Chrysobothris femorata* Fabr.)

On Apple, &c.

Fig. 2.



Colors — dark brown with brassy spots.

This Beetle is a very general feeder, being found not only in the Apple-tree, but in a great variety of forest-trees, oak, maple, &c. The larva is whitish, and when full-grown scarcely exceeds half an inch in length, and instead of being cylindrical, like the preceding, he is hammer-headed, his head, or fore-part rather, being twice as wide as the rest of the body, and so much flattened that he looks as if he had been squeezed flat between two squares of glass. Consequently, as the fore-part of his body is twice as wide as it is high, he bores a hole to fit it, of an oval shape, and twice as wide as high; whereas the other apple-tree borer bores a hole nearly as round as a pea. Hence, from the shape of the holes alone, it is always easy to distinguish an Apple-tree, that has been bored up by this insect, from one that has been bored up by the "Two-striped Borer;" and as the insect itself is so much smaller than the other, its holes are also considerably smaller. The perfect insect appears at the same time of the year as the preceding, and its habits are in all respects similar, except that it flies by day and not by night, and the larva only requires twelve months, instead of twenty-four or over, to arrive at maturity, and except also that it does not confine itself to any particular part of the tree. It is, indeed, peculiarly fond of what are known as "sun-scalded" trees, attacking by preference the part of the trunk facing the southwest, where the bark has been killed; but I have dug them out of the butts of perfectly sound and healthy young Apple-trees, and I have also dug them out of Apple-tree limbs, which did not exceed three-quarters of an inch in diameter. Towards the end of May, the spot where they lie may generally be discovered by the bark sinking down slightly and changing color a little, and then is the best time to pursue them with the knife. They open no hole that I could ever perceive to throw out their "castings" by, and they never, so far as I have perceived, bore deep into the solid heart-wood like the preceding, though Dr. Fitch found them to do so.

But prevention is better than cure, and I find it much less trouble to keep borers out of my Apple-trees, than to dig them out when they are already there. The method is cheap, simple and effectual. About the last of May, or a little earlier or later according to the latitude, take a bar of common soap—the softer and newer the better—and go over your trees with it, rubbing them till they assume a whitish appearance. If you are certain that it is only the "Two-striped Borer" that is likely to molest you, you need only go over the lower part of the trunk and the principal crotch, in which last place it is a good plan to stick a chunk of the soap, to be washed down by the rains; but if you have the "Buprestis Borer" also to guard against, you must go over the entire trunk and the principal limbs also. Previous to 1861 my apple-trees used to be badly bored up by the "Buprestis," and one young tree it completely killed for me. In 1861 I adopted the above plan, on the recommendation of Dr. Fitch, the

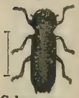
State Entomologist for New York, and have regularly followed it up every succeeding year. The result is, that I have never since had a single borer in any of my ten trees. Dr. Fitch states that he soaped a certain number of young trees in an orchard and left the rest untouched; and that the next year all the soaped trees were free from borers, and all the unsoaped trees were swarming with them. The borer that troubled him was the "two-striped" one exclusively. The borer that troubled me was the "Buprestis" exclusively, the other species not occurring within many miles of Rock Island, Ill. Consequently, it seems to follow that the "soap-remedy" is equally effectual against either insect.

The mode in which the soap operates is easily explained. The mother-beetle, perceiving the soap, is apprehensive that the tree is not a suitable home for her future progeny, and therefore refuses to lay her eggs upon it, and flies off elsewhere. If all two-legged bugs, that wear coats and pantaloons, took as much care of their future families as the six-legged bugs invariably do, there would not be near so much misery and distress in the world.

In the Valley of the Mississippi this insect is more generally troublesome to apple-trees than the preceding. In the Atlantic States, although it exists there, it is not recorded as being injurious to apple-trees. In a few instances it has been known to attack the Peach-tree, but this appears to be the exception and not the rule.

The Apple-twig Borer. (*Bostrichus bicaudatus*, Say.)

Fig. 3.



Color—very dark brown.

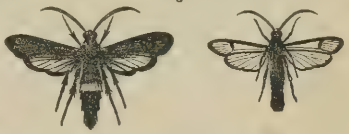
We have now to deal with a Beetle that is remarkable for boring our Apple-trees, not in the larva, but in the perfect state. During the month of June particular twigs, generally such as are about the size of a goose-quill, will often be found to be bored just above one of the buds, and on cutting into them it will be noticed that a cylindrical hole, about the size of a common knitting needle, extends downwards from the perforation above the bud, through the very heart of the twig, for the length of an inch or an inch and a half. In this hole will very frequently be found the insect figured in the annexed wood-cut, (the hair-line to the left showing its real length,) not with his head upwards, as he would lie if he had lived there in his larva state and had changed there to the perfect beetle, but with his head downwards and busily engaged in lengthening the hole. The males are distinguished by having two little thorns projecting backwards from their tail, and males as well as females are found in these holes, which proves that they bore them for food for themselves, and not as a nest for their future families. For almost invariably with insects, it is the female only that labors to provide for her future offspring, the males, like the men among the Red Indians, being too chivalrous to work. Where the larva of this particular insect breeds, we have at present no information; but from the analogy of allied species, it may be inferred that it breeds in the sapwood of forest trees. I have captured the perfect insect in the woods in September; and as I once found a single specimen, in the usual situation in an apple-twig, so early in the spring that it must have been there all winter, I infer from these facts that they often pass the winter in the perfect state. The great bulk of them, however, bore the apple-twigs in June, and not in the preceding autumn, and I have taken several in June when they were only just commencing their holes, so that half their bodies stuck out in the open air. Frequently a single twig will contain two or three of their holes; but in no instance did I ever find that one interfered with or ran into another. Though these despised little creatures have no pre-emption laws, and no magistrates to enforce them if they had any, yet they know enough not to "jump" one another's "claims;" which is more than can always be said of certain animals that are higher in the scale of creation.

This insect occurs in Pennsylvania and in the Valley of the Mississippi, but not in New York or the New England States. It is chiefly in the Valley of the Mississippi that it has been found to work upon apple-trees in the manner described above; and the only damage it occasions is, that the bored twig generally breaks off at the bored part with the first high wind. So long as the insect occurs only in moderate numbers, this would probably be a benefit, rather than an injury to the tree, being in the nature of a summer pruning. I am not aware that they have ever yet been found anywhere in such excessive numbers, as to do material damage; but if this should ever prove to be the case, the only remedy that I can suggest would be to search for the bored twigs in June, and cut them off and burn them.

The Peach-tree Borer, male and female.
(*Ægeria exitiosa*, Say.)

The three preceding Borers are all Beetles, belonging to three very distinct families of the Order *Coleoptera* (Sheathed-wings.) The annexed engraving represents the two sexes of a Borer belonging to an entirely different Order—*Lepidoptera* (Scaly-wings)—which comprises the Butterflies and the Moths or "Millers" as they are popularly called. The one to the right hand is the male, the one to the left hand the female. As will be noticed the male is very different from the female, so different indeed that it was formerly mistaken for a distinct species. The larva on a cursory view might be readily confounded with that of the "Two-striped Borer," being about the same size, shape and color; but a close inspection will show that it has got six minute legs, whereas the other larva is absolutely legless. In one point, however, it resembles the other larva closely, viz: in being peculiarly fond of the butt of the tree it inhabits, though, as with the other insect, specimens are occasionally found in the crotch. Moreover, the Peach-tree borer generally works a little below the surface of the earth, instead of a little above, which is the favorite part with the "Two-striped" borer. Like the "Buprestis" borer, it lives only one year in the larva state, but the perfect insect comes out later in the year, viz: in July and August, instead of June. In their general habits, they resemble other boring insects, but they never burrow into the heartwood, and wherever they occur in the Peach-tree—whether under ground in the collar of the tree, or above ground in the crotch—there a copious mass of thick gum exudes, which serves the useful purpose of directing us to the place of their retreat. This same insect is occasionally, according to Dr. Fitch, found on the Plum-tree; and he notices the remarkable fact, that although the Plum-tree is ge-

Fig. 4.



Colors—steel-blue and yellow.

nerally more disposed to exude gum than the Peach-tree, yet Plum-trees attacked by this borer exude no gum at all from the spot where it has taken up its abode.

Various modes have been adopted, for getting rid of this troublesome pest after the tree has already been attacked, and various other modes for preventing a lodgment therein. These we will take up in order, as, when understandingly applied, they are all more or less effectual.

Remedy 1st. The corn-cob and the knife. In the autumn the larvæ are most of them quite small and have not yet burrowed under the bark; and they may then be readily destroyed by removing the earth from the collar of the tree and rubbing the bark vigorously with a corn-cob or other such substance. In the spring they are hid under the bark, but even then the knife will reach them.

Remedy 2nd. The hot-water cure. The larvæ may be destroyed at any time of the year by pouring boiling water on the part attacked by them. This kills the larvæ, but does not in any wise injure the trees. It might be thought that Apple-tree borers could be attacked in the same way, but unfortunately they usually lie too deep under the bark for the heat to reach them.

Remedy 3rd. The hoe cure. Bank up your trees a foot high or so in June, i. e. before the Moth appears that lays the eggs that produce the borers. Then in the autumn, before the frosts set in, level down the bank, and you expose the young larvæ, which have not yet burrowed under the bark, to the full benefit of the early frosts, and especially to the attacks of birds, which at that time of the year are hard put to it for food. It answers nearly the same purpose to leave the earth on its natural level through the summer, and in the autumn to uncover the collar of the tree and the large roots springing therefrom. The principle in both cases is the same. The latter method, according to Solon Robinson, is the one now generally adopted in the Vineland settlement in New Jersey. (*N. Y. Sem. Trib.* Nov. 24, 1865.)

Preventive 1st. Surround the butt of the tree with a strip of roofing paper a foot wide, having first removed the earth from the collar; secure the paper above with strings and below by returning the earth upon it, taking care that at least two inches of the paper is under ground. This will not prevent any eggs or young larvæ that are already there from developing, but it prevents the moth from laying fresh eggs in her favorite spot. A correspondent of the Practical Entomologist complains, that she tried this method and found it useless. The reason, no doubt, is that there were eggs or very young larvæ already on her trees, when she surrounded them with paper.

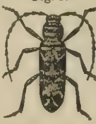
In Mungo Park's Travels in Africa there is a story of a certain African tribe, who went out to hunt the Lion after a new patent method recently invented by some ebony genius. They made a great open-work cage, something like a lady's hoops, only much larger and stronger and closed in at top, and a dozen men bearing it on their shoulders went boldly forth into the thicket where the Lion lay. The *theory* was excellent. As soon as they saw the Lion, they were to drop the great Cage over themselves, and then stab him with their spears as he was vainly endeavoring to force his way in among them. Unfortunately, however, in *practice* they missed the right time; for they dropped the Cage a little too late, and the shaggy monster slipped in under it and devoured them all at his leisure. Just so with the fair correspondent of the Practical Entomologist. Instead of shutting her enemy *out*, she was a little too slow in her operations, and shut him *in*. In both cases the theory was unexceptionable, and the only fault was in the practical application of it.

Preventive 2nd. Remove the earth as before and surround the butt of the tree with a bundle of straw, to the thickness of two inches, binding it around with twine and returning the earth on the butts of the straw. To this method the same remarks apply as to the first. Nobody but a practiced entomologist, whose eyes distinguish an insect no bigger than a pin's head as readily as a farmer sees a goose or a turkey, should try either of these methods except in the spring of the year, when the larvæ are large and easily betrayed by the exuding gum.

Preventive 3rd. Place a heap of tobacco stems round the butt of the tree in June. The smell of the tobacco is so offensive to the mother-moth, that she always refuses to lay her eggs on trees thus protected. Some practical men also recommend placing half a pint of salt in a bag in the crotch of the tree, or smearing gas tar copiously round the butt; but both these substances, when applied in too large doses, are destructive to vegetable life, whereas soap and tobacco are almost universally offensive to insects, and yet absolutely innocuous even in the largest doses to plants. I may add here that I tried some time ago the "soap-cure," which is so effectual against the two apple-tree borers, on three different peach-trees in my garden, but that it appeared to do no good whatever, as in the following spring they were alive with borers. Why soap should be offensive to a beetle and in no wise offensive to a moth, is one of those mysteries, which can only be explained when we can tell, why sheep will eat greedily scores of different weeds that cows will not touch; or why some men are very fond of cheese and others sicken at the very smell of it.

The locust borer. (*Clytus robiniæ*, Forster, Walsh.)

Fig. 5.



Colors—black and yellow.

The annexed figure represents the male sex of the locust borer; the female scarcely differs except in the antennæ (or horns) being a little shorter. At first sight it might be supposed that this Beetle belongs to the same species as that represented in Fig. 6, which is the male of the "Painted Borer" of the Hickory. But a closer inspection will show that this last differs in having much longer and stouter legs and much longer and stouter antennæ, and in having its body tapered behind to a blunt point.* And not only do the two insects differ in these respects, but they differ in the trees which they inhabit, and in the time of year at which the perfect beetles come forth out of those trees—the Locust-borer appearing in September and the Hickory-borer in June. What is very remarkable, although the males are always without exception distinguishable by the characters mentioned above, the females are *not distinguishable at all.* Indeed, until I published on the subject,† it had always been supposed by authors, that there was no difference whatever between the locust-feeding beetle and the hickory-feeding beetle, and that the same female laid her eggs indiscriminately either upon the locust or the hickory. Those who desire fuller details on this subject are referred to the two passages in my Papers which have just been quoted in a note.

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* The figure does not show the difference in the length of the legs, as plainly as it ought to do, owing to the foreshortening of the thighs.

† *Proc. Boston Soc. Nat. History*, 1864, pp. 296-7, and *Proc. Ent. Soc. Philad.* II. pp. 420-2.

The history of this species is very curious, and as it has only recently been elucidated by myself, and some additional details can now be added, may be briefly summed up as follows:—About a hundred years ago this insect was well known to Forster to inhabit the Locust in the State of New York. Twenty years ago, although the best Illinois botanists agree that the locust grows wild in the Southern part of Illinois, it was still unknown in that State. Shortly afterwards it commenced attacking the locusts in the neighborhood of Chicago, and thence spread gradually in a South, South-west and West direction through the State, sweeping the locusts before it wherever it came. In 1860 it had pretty well destroyed all these trees in Central Illinois. Rock Island lies on the Mississippi River 180 miles South of West from Chicago. In 1862 it had reached a point 20 miles East of Rock Island. In 1863 it burst forth suddenly in great swarms from all the locusts in Rock Island, and the two following years about completed their destruction. It has now (1865) crossed the river into Iowa, and no doubt will continue its travels westward as long as it finds any locust-trees to prey on.

Lest it should be supposed, that, agreeably to the belief of all the older writers, the species that inhabits the hickory is identical with that which inhabits the locust, it is proper to add here, that I myself split the hickory insect, out of a stick of hickory wood, as much as eight years ago in Rock Island; that abundance of hickory grows in the woods within half a mile of that city; and yet that our locust trees were never attacked by borers until 1863, when they were suddenly attacked in the manner mentioned above. Prof. Sheldon of Davenport, Iowa, has also repeatedly, for many years before 1863, split the hickory insect out of hickory wood in Davenport, although, so far as he is aware, the locusts in Davenport had not been attacked by borers up to 1863. Now, if the hickory-borer is identical with the locust-borer, why did it not attack the locusts in Rock Island and Davenport before 1863 and 1864? And why, when it did attack them, did it appear suddenly in great swarms?

The larva of this insect resembles so closely that of the "Two-striped Borer," in shape, size and color, that the general observer would see no difference at all between them. It is, however, readily distinguishable in the eyes of the entomologist by having six minute legs, while the other is entirely legless.

As to any available means of counterworking this insect, it is scarcely worth while to talk about it, when it invades us in such prodigious swarms as it does, and when, after all, it is only a shade-tree and not a fruit-tree that is attacked. In case, however, any one should have a favorite locust, which he is desirous of preserving, no matter at what cost, it may be stated that if it is well rubbed with soap about the last of August, the mother-beetle will in all probability avoid it in September, when she is flying round in search of a suitable place whereon to lay her eggs. The "Two-striped Borer" and the "Locust-borer" are, entomologically speaking, so closely allied, that we may with tolerable safety argue from the tastes of the one to the tastes of the other; and as soap is proved to be highly offensive to the former, it is reasonable to infer that it will also be offensive to the latter.

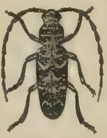
Many persons, in places where the Locust-borer has been swarming, have been much alarmed by the idea, that after it has finished with the Locusts it will commence on the Apples and other fruit-trees. There is no ground whatever for any such expectation. They might just as reasonably expect a starved cat to take to eating hay, or a hungry rabbit to make an onslaught upon the bacon; for there is no other tree but the Locust and occasionally the Honey-locust in which, so far as is at present known, this insect can live.

The painted borer. (*Clytus pictus*, Drury, Walsh.)

ON HICKORY AND WALNUT.

The chief points in the history of this Beetle having been already noticed under the head of the preceding, it is only necessary to add that its larva differs from that of the preceding in being absolutely legless; unless, indeed, which I scarcely think can be possible, Dr. Horn made some mistake in its identity.* The annexed figure represents the perfect or winged male; the female, except in the fact of its antennæ being a trifle shorter, almost exactly resembles Fig. 5. In Illinois this insect is rather rare; for in seven years' steady collecting I have met with but three specimens. Near Philadelphia it appears to be quite common, and it is said to inhabit the walnut as well as the hickory, which two trees belong, as is well known, to closely allied genera. In the Valley of the Mississippi our commonest Hickory Borer is the one noticed at the end of this Article and shown in Fig. 8, but that species seems to attack the felled or dead timber only.

Fig. 6.

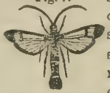


Colors — black and yellow.

The Currant Borer. (*Ægeria tipuliformis*, Linn.)

The two Borers last noticed were Beetles, (*Coleoptera.*) We now once more return to the *Lepidoptera* (Butterflies and Moths), to which the Peach-tree Borer was found to appertain. The "Currant Borer" is a species of the very same genus to which this last belongs, and consequently, as will be seen at once, it resembles it a good deal, although it is considerably smaller. The larva also closely resembles that of the Peach-tree Borer, except in its smaller size; but unlike that insect, it does not inhabit the collar of the currant bush nor even any of its main limbs, but only the twigs, which it bores lengthways much after the fashion of the "Apple-twig Borer" (Fig. 3), so that they either wither away and die, or lop down in an unseemly manner, or break off with the first high wind. Unless it occurs in unreasonably large numbers, I doubt very much whether this insect is not beneficial, rather than otherwise, to the shrub which it inhabits, by operating as Nature's own pruning-knife. For we all know that the Currant bush, in our climate, is naturally a little too much inclined to run to wood; and gardeners tell us that summer-pruning inclines a tree to run to fruit.

Fig. 7.



Colors—black and yellow.

The readiest mode to get rid of this insect, where it occurs in undue numbers, is to cut off the bored twigs in May, or earlier if convenient, and burn them. As the perfect insect appears in June, it will thus be prevented from running its natural course, and laying a fresh stock of eggs on the twigs, to start a new brood of borers for the succeeding year. Unlike the other seven Borers noticed in this article, the Currant Borer is not a native American, but an imported citizen.

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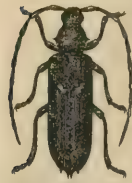
*See remarks on this subject in a Paper of mine now printing in the *Proceedings Ent. Soc. Philad.*

The banded Borer. (*Cerasphorus cinctus*, Drury.)

On Hickory after it is felled

Almost every one has some time or other been annoyed at finding a choice stick of hickory wood, which had been laid aside for some special purpose, badly "powder-posted," as it is called. But probably not one out of a thousand such persons have the most distant idea, as to what manner of insect does the mischief, and some perhaps do not even know that the damage is done by any living creature, and attribute it to a certain mysterious influence exercised upon the wood by some of the planetary bodies. At all events, I knew an old Pennsylvania Dutchman who believed firmly to the day of his death—in spite of all my arguments to the contrary—that if hickory wood was cut in a particular state of the moon it would never "powder-post," but if cut at any other time, it would "powder-post" infallibly. What was the right time of the moon, he did not profess to know himself, and he allowed that he had cut hickory wood both in the new and in the old of the moon, and found it "powder-post" badly. Still, that there was some particular time of the moon so benignly favorable, that hickory cut at that time would last forever without "powder-posting," he had the fullest and firmest belief; and, as is often the case with wiser men, who allow their faith to overmaster their reasoning powers, it was useless to try to argue him out of his belief.

Fig. 8.



Colors—brown and yellowish-white

The figure given above shows the perfect beetle, that lays the egg on the hickory, that produces the boring larva, which, and not the moon, is the real author of the well-known "powder-post." This larva closely resembles, in its general appearance, that of the "Two-striped Borer," but, unless my memory deceives me, it has six minute legs. In any case, if it has not such legs, it ought, according to established entomological rules, to have them; otherwise it would be as anomalous a fact as the larva of the "Painted Borer" (Fig. 6) being legless.*

Reasoning once more from analogy, I should infer that it would be a very useful precaution to soap or grease early in June, wherever there is either sapwood or bark left by the saw, hickory wood which we desire to preserve from this borer. Our western wagon-makers generally have a considerable stock of this valuable lumber laid up to season, and sometimes have a good deal of it spoiled or damaged by "powder-post." For although, according to Dr. Harris, this insect is rare in Massachusetts, it is very common in the Valley of the Mississippi. After the lumber has been worked up and well painted, there is no longer any danger, except from such larvæ as are already inside; but it is perfectly possible for an axle-tree, which is to all external appearance sound, to contain enough larvæ to ruin it in six months. It occasionally happens that, even before a carriage leaves the shop, one or two of these larvæ bore right through the paint to the surface, either for the purpose of pushing out their castings or of affording a commodious passage to the perfect beetle. Whether a new axle-tree or a new shaft is then put in, or whether the holes are plugged up with paint and putty, is one of those Masonic mysteries which the outside world knows nothing of. So abundant is the insect near Rock Island, that in a lot of hickory pea-sticks, enough to make about four good-sized faggots, which I had some years ago preserved through the winter, I found in the following spring several hundred larvæ, from some of which I bred not only great numbers of the perfect beetle, but also a large ichneumon-fly, (the *Mesochorus fuscipennis* of Brullé,) which is parasitic upon them, and no doubt helps to prevent their exorbitant increase.*

There are several other borers that infest the hickory in small numbers, some attacking the living tree and some the felled timber; but as they are by no means abundant, at least not in this neighborhood, it has not been thought necessary to refer to them particularly.

To many persons, perhaps, the damage done by such puny spoilers as the above will seem too insignificant to be worth taking into account. It is, in reality, a mere flea-bite, when compared with the gigantic drains upon the purses of our citizens, made by the Hessian Fly, the Curculio, or the Chinch-bug. Still it amounts to something quite considerable. Let us look a little into the statistics of the case, and we shall soon satisfy ourselves that it is so. There are in the town of Rock Island, Ill., three old, established firms for the manufacture of wagons and carriages, which were all of them in full operation in 1859, when the last U. S. Census was taken, besides several new ones which have been established since. I have consulted the principals of all these three firms, and they estimate the average total value of the Hickory lumber annually consumed by them in their regular business at $975, and the damage annually done to it by "powder-post" at from 15 to 20 per cent. Now in 1859, in the whole county of Rock Island, there were, in addition to these three city firms, ten country firms, the united business of which, estimated from the number of hands employed, just about equalled that done by the three city firms. Hence we may put the total of Hickory lumber annually consumed by wagon-makers in the whole county at $1950. Put the annual damage done to this lumber by the Borer at 17½ per cent., and the result is $341.25. But this is only the damage done in a single county of a single State. Upon enquiry, I find that the "powder-post" is pretty uniform in its operations, not only throughout the State of Illinois, but even in the New England States. We may, therefore, as Rock Island county is a fair average county, not remarkable for any undue excess of wagon-makers, find the damage annually done by this Hickory Borer to the wagon trade, throughout the whole State of Illinois, by merely working the following simple Rule of Three Sum :—As the population of Rock Island county in 1859 (21,005) is to the population of the whole State in 1859 (1,711,951), so is the damage annually done in Rock Island county ($341.25) to the required damage annually done in the whole State. The quotient is $27,812.58. It foots up, does it not? And yet this only includes the damage done by this one particular insect to one trade, in one State out of the thirty-six, and is exclusive of that done in other mechanical departments, and of that done to wagons and carriages after they have passed into the hands of the consumer, which, as several wagon-makers assure me, is something quite considerable.

Suppose now the State of Illinois were to determine to expend $5,000 in the attempt to prevent, or at all events to palliate, this loss. This is probably at least ten times as much as would be necessary, but I always like to understate, rather than to overstate a case. Suppose further, that the result should be, not a perfect cure, but only a palliation of the damage to the extent of 10 per cent. annually. There would then be $2,781.25 worth of Hickory lumber annually saved to the State, against which we should have to set, 1*st*, the annual cost to the wagon-makers of applying the newly-discovered remedy, which, to be on the safe side, we will put at the odd $1,781.25; and 2*nd*, the annual interest on the sum invested, which, at 10 per cent., would be $500. The balance to be carried to the profit side of the State Ledger would be annually $500, or cent per cent upon the sum annually expended by the State. Most merchants would consider this a very fair business operation.

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*I find that it really has legs.—Jan. 25, 1866.

*Brullé has wrongly referred this species to the genus *Mesochorus*. It belongs in reality to a new and exclusively American genus, allied to *Xorides* and *Odontomerus*, which at some future time I shall describe under the name of *Caryœcus* (Hickory dweller.)

It may be objected that this would be class-legislation, and that it would be an unjust thing to tax the whole community for the special benefit of either the Gardener, or the Orchardist, or the Wagon-maker. But in almost all such cases as these, the commodity produced is either too bulky or too perishable to be supplied from the market of the world, and therefore its price is not governed by the market of the world but by the local market. Consequently it would make no difference at all to the Wagon-maker, for example, if 50 or 75 per cent.—instead of 17½ per cent.—of his Hickory lumber was annually "powder-posted" and ruined. He would then of course, just as he does now, put the entire loss upon the price of his manufactured goods; and, as in all such cases, it would be the consumer, *i. e.* the general mass of the citizens, that eventually had to foot the bill. Precisely on the same principles, if he had less Hickory lumber annually destroyed, competition would compel him to lower the price of his manufactured goods, and then it would be the consumer, and not the manufacturer, that would reap the benefit. No fact in Political Economy is better known or better established than this. On the other hand, commodities such as Beef, Pork, Corn and Wheat, which may be supplied from the market of the world, and the price of which is therefore governed by their price, not in the local market, but in the market of the world, are in the State of Illinois almost all of them produced by the Farmers. Here, indeed, it is undoubtedly true, that any discovery that enabled the Farmers to raise, for example, more Wheat or more Corn, would put money into their private pockets. But it is notorious, that whatever benefits the Farmers of Illinois benefits the whole community also, because Illinois is essentially an agricultural State.

I have dwelt, at perhaps undue length, upon this apparently trivial case of damage done by Insects, because there are scores of such cases, known only to the Entomologist and to the particular tradesman whose property is injured. The damage done in each case is, comparatively speaking, small, but the sum total foots up away into the millions. Add to these the well-known and thrice-told tale of the almost fabulous amounts, annually filched out of the pockets of the Agriculturists by the Bark-louse, the White Grub, the Plant-louse, the Army-worm, the Codling Moth, the Plum Gouger, the Curculio, the Hessian Fly, the Wheat-midge, the Chinch-bug, and a host of others; and I am satisfied that my former estimate of $20,000,000, as the average annual damage done to the single State of Illinois by Noxious Insects, is rather below than above the mark. By means of carefully conducted experiments, I have little doubt that a considerable percentage of this gigantic amount might, in process of time, be annually saved to the State. But if only 1 per cent. was eventually saved, there would be an annual gain to the State for all time of $200,000.

It is very true that such investments as those referred to above redound, not only to the benefit of the particular State that makes them, but also to that of the whole Union. But to a patriotic State this would be an incentive, rather than an objection. When, some twenty years ago, New York engaged Dr. Fitch as her State Entomologist, she never stopped to enquire whether other States might not be jointly benefited with herself—as has actually proved to be the case—by the scientific investigations of that distinguished Naturalist. When Massachusetts voted a sum of money, to enable Dr. Harris to write his well-known and excellent Report on Injurious Insects, it never occurred to her to ask, whether the book would not circulate in other States besides Massachusetts. The West has hitherto been sponging on the East for information on this all-important subject. Let her now reciprocate the obligation. She ought to do this, if only from purely selfish motives; for she has many Injurious Insects, as for example the Chinch-bug and the New York Weevil, which, although they occur in very minute numbers in the Eastern States, yet never swarm there, as they often do in the West, so as to come under the observation of Eastern Entomologists. Besides, Illinois, as is well known, was called upon in the late war to find a General-in-chief for the armies of the whole Union. She responded to the call; how well and how gloriously she responded, is known to the whole world. People, therefore, naturally expect of her now to furnish a Bugmaster-general for that far more numerous and more destructive army—the Noxious Insects of the United States.

The recommendations given above with regard to remedies will, doubtless, strike the intelligent reader as, in some cases, based too much upon analogies and inferences, and too little upon facts and experiments. I am well aware myself, that all such recommendations, however theoretically specious, ought to be practically tested by a sufficient series of careful experiments, before they are finally accepted as reliable. There are experiments enough of this nature—bearing upon the practicability of counterworking the various noxious insects, that annually, within the United States, destroy at least three hundred million dollars' worth of property—to occupy the entire life-time of fifty good and experienced Naturalists. For a single private individual to attempt to make any headway against this vast sea of labor, would be like Mrs. Partington trying to mop up the Atlantic Ocean. Besides, why should any scientific man gratuitously devote his time to drudgery of this kind? It is of no manner of scientific interest, whether the farmers of the United States annually lose fifty million dollars by the Chinch Bug, the Hessian Fly and the Wheat Midge, or whether they lose only fifty cents by these same three insects. The natural history of these three insects is, of course, scientifically interesting, just as is that of any other three insects, that have never yet inflicted one cent's worth of damage upon the Agricultural Community. But it belongs to Art, and not to Science, to test the practical efficiency of the various artificial means, by which the ravages of these and other noxious insects may be either palliated or prevented. Any fact that, in the regular course of his scientific researches, comes to the knowledge of the Naturalist, bearing upon utilitarian objects, he freely and without stint communicates to the public. In the Scientific World there are no secrets, and none but the Charlatan endeavors to make merchandize of so pure and holy a thing as Science. But it is sheer folly to expect the private student, when the whole bright heaven of unexplored knowledge lies open to his view and blazing above him, to grovel on the earth and gratuitously devote an inglorious life-time to the transmutation of dimes into dollars in the pockets of his fellow-citizens.

ROCK ISLAND, ILL., Dec. 25, 1865.

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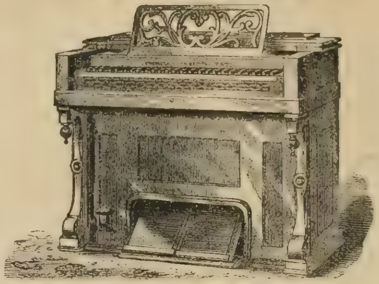

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THE

Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for gratuitous distribution among Farmers and Agriculturists.

VOL. I. FEBRUARY 26, 1866. No. 5.

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☞ Those wishing to receive the BULLETIN regularly, should send, with their names and address, **12** cents to prepay the postage for one year. All subscriptions must date from the commencement of the volume.

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J. W. McALLISTER, } EDITORS.
BENJ. D. WALSH, Rock Island, Illinois,
ASSOCIATE EDITOR.

PHILADELPHIA, FEBRUARY 26, 1866.

☞ We are gratified to be able to state that the circulation of our little sheet has increased rapidly, and will soon reach eight thousand copies monthly. To our many friends who have taken us by the hand and helped us on, we return our sincere thanks. When we launched our little bark it was with some misgivings; the idea—though not a new one in other branches of science—was new in the department on which we designed to treat. Entomology, strange as it may appear, has comparatively few students. While in other departments of Natural Sciences students are obliged to search in distant places for the objects they desire for investigation, the Entomologist can, at his own hearth, in his own garden, on the street, in the very air he breathes, find some object worthy of his study and research. With the material on every hand, it seems strange that so few have become lovers of this really beautiful branch of the Natural Sciences. But apart from the scientific investigations of the subject, it has a practical value, and the demonstration of this feature is the mission of our monthly journal. Avoiding all scientific terms (as near as we can) in the descriptions of insects, we endeavor to reach the plain practical farmer, showing him who are his friends and who are his enemies. With this object in view, we shall endeavor to make our journal a necessity among those for whom it is intended.

The encouragement we have received incites us to new energy. Three editions of our first three numbers have already been printed, and from present indications, we shall soon publish a fourth. This extra labor has caused some delay, and quite a number of orders remain unfilled, but will be attended to promptly. Our advertising columns are becoming well filled, and the business man will soon learn their value. From Canada to Virginia, and from the Atlantic to the Pacific Coast, our little paper takes its monthly journey, and as soon as mail communications are opened through the Southern States, our circulation will be still more largely increased, and form a most valuable medium for advertising.

The labor bestowed upon this paper may not be appreciated by those ignorant of the variety of matters necessarily brought to the notice of the Editors, but it is nevertheless cheerfully, willingly and gratuitously done, with no other reward than the satisfaction of imparting valuable information.

☞ We call attention to the "Proceedings" of the Entomological Society of Philadelphia, advertised in this number. An edition of only 250 copies was printed of Vols. 1—4, and but few copies remain to be sold. The Publication Committee, in another column, solicit subscriptions for 1866; those desiring a copy will please forward their names as early as possible, so that the subscription list may be made up. The Committee propose to issue a number of about 100 pages, every three months, making a volume of 400 pages and several plates for $3, which will scarcely cover the cost of publication.

ANSWERS TO CORRESPONDENTS.

R. Parnell, N. Y.—You send the moulted skins of some elongate, six-legged, brown larvæ, about one-third of an inch long, and with a little bunch of hairs on their tails, which, as you say, have nearly destroyed all the feathers in a feather bed. They belong to the Order of *Beetles* (Coleoptera) and to the Family *Dermestes*, and probably to the genus *Attagenus* in that family, several species of which are very destructive to hides and feathers. In the perfect or winged form they are dark-colored, oval insects, of a hard, shelly substance, like most other Beetles, and most likely you found some of them either dead or alive among the feathers, without suspecting them to be merely the perfect form of the lively larvæ that did the mischief.

You say you have tried tobacco, camphor, &c., and exposure to the hot rays of a July sun, by way of remedy, without effect. That we can readily believe. You can generally get rid of the different kinds of moths that in the larva state destroy furs, hides, carpets, woollen clothes, &c., by such means as these; but the *Dermestes* family are peculiarly "hard cases," as most Entomologists know to their cost, and though camphor will generally prevent their founding a new colony, it will not break up the colony after it is already founded. Your only remedy is *heat*, applied in such a way as not to injure the substance on which they prey, and yet to be sufficient to destroy insect life either in the egg, larva or perfect state. Immersion in boiling water fulfils these conditions. And with this object in view, if you have any factory in your neighborhood that boils water in large, open vats, head up your feather bed in a tight, and *perfectly dry* barrel, and immerse the whole in a vat of boiling water (lager-beer would do equally well, if hot enough) for half an hour. If you have no such convenience, your only remedy will be to treat the feathers and the bed-tick in the same way in small parcels at a time, or to bake them in an oven. But in this last case, you have to be very careful not to heat your oven too hot, and yet to have it hot enough to kill your enemies. Whichever mode you employ, make the ticking of your bed as tight as possible, after you are through, so as to prevent any stray *Attagenus* from working his way in and founding a new colony.

If you think both these methods too much trouble, you had best burn your bed at once; for the insects, if left to themselves, will eat it all up in a year or two—such are their powers of multiplication—and then start on a voyage of discovery for something else to work on.

Thirty years ago, a species belonging to this same family—the *Dermestes vulpinus*—was found to be so ruinously destructive in the great hide-warehouses in the city of London, England, that the hide-merchants offered a reward of $100,000 to any one who could discover a cheap and effectual remedy to get rid of them. We believe the reward was never earned. The hot-water cure, though effectual enough, was not sufficiently cheap.

Isaac Hicks, N. Y.—The "small white maggot" which, as you say, "perforates your apples and sometimes renders them of no value to use or to sell," is most probably the larva of the well-known Codling moth (*Carpocapsa pomonella*), which was originally, like many other noxious insects, imported from Europe, and within the last year or two has been very abundant and destructive, not only on the Atlantic seaboard, but also in the Valley of the Mississippi. Its history may be thus briefly told. The moth deposits its egg in the eye (or bloom end) of the apple, and the larva hatching out therefrom burrows into the heart or core of the apple and feeds on its substance. When full grown, *i. e.* about half an inch long, it bores a passage way out for itself, sometimes along the same road that it came in by, sometimes through the cheek of the apple, thereby making a brown, discolored hole about the size of a crow-quill. Before it is finally ready to come out, the apple infested by it usually, but not always, falls to the ground. Soon after this it changes into the pupa state, having first spun for itself a thin, gauzy cocoon in the chinks of the bark or other such appropriate hiding-place. The moth comes out from the pupa in June and July, when it lays its eggs for a second brood in the half-grown apples, the pupæ of which do not come out into the moth state till the following spring, at which time the next year's crop of apples is just beginning to grow. You will find a figure and description of the moth in Harris's *Injurious Insects*, pp. 484–5. It is a beautiful little insect, with a large patch of burnished copper on its wings, and it is a pity that being so beautiful it should be so mischievous.

The most effectual remedy is to pick up and destroy all the wormy apples as soon as they fall from the trees, as most of these, though not all, still contain the living larva, no matter whether they are bored or not. It is also stated that, by wrapping any old rag round the tree, the larvæ will gather into it to spin their cocoons, when of course they must be treated as the Western folks treat horse-thieves, *i. e.* made to promise not to do so any more.

Strictly speaking, the larva is not a "maggot," as you call it, but a "caterpillar," for it has got sixteen legs and a large horny head, whereas the term "maggot" is properly applied only to larvæ such as those of the common blow-fly, which have no distinct horny head and no legs at all. If you find your larvæ are really and truly "maggots," send us specimens next summer; but we expect, like many other men, you have confounded the two terms.

J. H. Foster, Jr., Penna.—You think that the *Aphis* that causes warts or knots on the roots of young apple trees in the Nursery, and thereby renders them unsaleable, is the same insect as the *Woolly Aphis* that lives on the twigs. You are undoubtedly mistaken, for they do not even belong to the same genus, much less to the same species. The Woolly Aphis is *Eriosoma lanigera;* the Apple-root Aphis is *Pemphigus pyri.* If you examine the winged insects, you will find that the former always has the third vein that branches from the main rib-vein in its front wings *forked*, while the latter always has this same vein *perfectly simple.* In the true genus *Aphis*, to which appertains the common Leaf Aphis of the Apple, this same vein is *three-forked.* You will find a figure illustrating the differences between the different genera of the *Aphis* family in our *Proceedings*, Vol. I. p. 297.

Wm. Manlius Smith, N. Y.—What you take to be young plant-lice hatched out in the winter from eggs, are not plant-lice, nor even true insects of any kind, but a kind of Mite often found under the bark of trees, where it probably feeds upon the partly decayed matter which occurs in such situations. All true insects have *six* legs and a head distinct from the thorax. The class *Arachnida*, to which the Mites, the Spiders and the Wood-ticks (but not the Sheep-tick, which is a true insect) appertain, differs from the true insects in having *eight* legs and no separation between the head and thorax. The specimens you sent along with the piece of bark arrived in good order, and all alive and kicking.

You can find what are really the eggs of the Apple plant-louse on the *outside* of the twigs of apple-trees. They are quite small, oval, shining, black objects, about the size of tobacco or poppy seed, and are generally intermixed with some fine woolly matter which probably serves to fasten them to the twig. Towards the spring those on the upper side of the twig are very generally washed away by the weather. As you are probably aware, these eggs are only laid in the autumn; and during the whole summer the female plant-louse, instead of laying eggs, brings forth her young alive. Nature's object evidently is, to continue the breed through the winter; for if the female plant-louse continued to bring forth living offspring to the last, as soon as the leaves fell these would perish for want of food, and the species would disappear from off the face of the earth.

S. P. M., N. Y.—The drawing you sent represents the caterpillar popularly known as the "Saddle-back," which feeds on a great variety of plants, but is not generally very destructive. The moth—the *Eupretia stimulea* of Clemens—has the front wings of a uniform ferruginous-brown color, with two small subapical white spots, and the male has two more near the base of each wing; the hind wings are pale reddish-brown. The spines which cover the horns of the caterpillar, produce a painful sensation—not unlike that caused by nettles—when brought in contact with the back of the hand, or any portion of the body on which the skin is thin. We shall be glad to hear from you whenever you have anything on our subject to communicate.

James A. Fenwick, N. J.—We shall be happy to receive from you specimens of the insects you speak of as being destructive to your Cranberry crop, also any information of their habits that you may possess.

T. T. Southwick, N. Y.—You say the 17-year Locusts were very thick in parts of Livingston county, N. Y., in 1865. Please inquire how far they extended in that year in your neighborhood, and report the result to us. The 17-year Locust is easily distinguishable from other kinds of Locust by the wings being marked with bright orange and the top of the thorax having no orange markings.

E. D. Wright, Ohio.—The caterpillar that infests your trees is most probably the Red-humped Prominent, (*Notodonta concinna*,) which has a red head and a red hump on the fore part of its back. In August and September they descend from the trees to the ground, and spin a cocoon under any loose rubbish or sometimes partly under ground. The moth comes out in June and July of the following year, and lays its eggs on the under side of the leaves, just as you describe. In Harris's *Injurious Insects*, p. 425, you will see a figure of the caterpillar, and in Plate 6, fig. 11, a colored figure of the moth, which has full-sized wings in both sexes, unlike the notorious Cankerworm, the female of which is wingless. I have found the caterpillars on my Apple-trees as early as July 21.

As to the apple-worm or codling-moth, you will find a short notice of that insect in our answer to Isaac Hicks, N. Y. B. D. W.

G. W. H. of Ohio wishes the best information on fruit-growing. Join a Horticultural Society of practical fruit-growers in your vicinity, and if there is none in existence, form one. An interchange of experience is worth more than any book you can purchase; in the meantime, get the reports of State and other local Horticultural Societies. L.

Means of Defence Against Noxious Insects.

We occupy considerable space in this number with an extract from the excellent *Treatise on Injurious Insects*, by Vincent Köllar, a German Naturalist. This useful work was published (in 1837) by the command of Emperor Francis I of Austria, for the benefit of the farmers, foresters and gardeners of that country. In 1840 it was translated from the German into the English language, and illustrated by numerous engravings, by Jane and Mary Loudon, with notes by Prof. Westwood. It contains a vast deal of useful information, which should be made known to our farmers, gardeners, &c., and we shall, from time to time, make such extracts from it as might interest our readers. The following extract throws out some good hints, and is well worth the space it occupies:—

"The means of defence against noxious insects are two-fold; first, those which nature employs to circumscribe the too great increase of certain insects; and secondly, those which human understanding can oppose to the evil arising from the superfluity of noxious insects.

"1. MEANS CONTRIVED BY NATURE TO CONFINE THE DEVASTATIONS OF INSECTS.—Many appearances in nature, even such as at first cause anxiety and care, on account of their injurious consequences, are found to be in many respects highly beneficial and salutary, although we may not always understand them. Thus, continued rain, which in many respects is extremely hurtful, contributes greatly to diminish the number of noxious insects, and for a series of years renders them entirely innocuous. This continued rain may, for example, take place at the pairing time of certain insects, which will greatly obstruct them; or at the time when the insects are in the caterpillar or larva state, when thousands die in consequence of bad weather, and our fields, orchards and woods are cleared of a dangerous enemy for many years.

"Thus, in the spring of 1832, after incessant rain, I saw the caterpillars of the white-thorn butterfly, which for many years had not only stripped all the hedges, but also done considerable injury to the fruit-trees, dying by thousands, as if of a dropsy. The caterpillars swelled, became week, and died. If they did attain the pupa state, they suffered from the same evil, and the perfect insect was very rarely developed, on which account our gardens in the following years were entirely spared.

"Late frosts are also very beneficial, as they entirely destroy many insects in their larva state. I had an opportunity, early in the summer of 1833, of observing great devastation on the fir-trees in the neighborhood of Vienna, by a species of saw-fly, (*Tenthredo rufa*, Klug.) The larva of this insect had attacked certain parts of a young forest of Scotch fir, and the question was how their ravages were to be prevented from increasing next year. Fortunately, in the month of May a moderate frost set in, and thousands of these larvæ were seen hanging to the twigs, as if scorched. In this manner their increase was limited for the future.

"A multitude of insects are also destroyed by inundations, particularly such as undergo their transformations in the earth, or live upon it in all their stages, more especially if the inundation happens when they are near their final transformation. In meadows the different species of May-bugs (*Melolonthidæ*) suffer by this means; in kitchen gardens the mole-cricket; in orchards the pupa of the small winter-moth (*Geometra brumata*), when the water overflows the gardens late in the autumn, at the time when the moth is usually developed from the pupa lying in the earth.

"Besides the means of preserving the equilibrium by storms, and the effects of the elements, nature employs a multitude of others, although not so speedy and efficient, to the same end.

"To these belong the enemies of the destructive insects which we meet with in all classes of the animal kingdom. Among the mammiferous animals the bats hold a conspicuous place for their destruction of insects. We only see them flying about in the twilight, precisely at the time when many moths leave their hiding-places, and hover round the flowers. As they live almost entirely on insects, they no doubt devour great numbers of the hurtful sorts. And perhaps it is to be ascribed to this circumstance that fruit-trees standing near houses, churches, barns, &c., suffer less from insects than isolated trees. They do not confine themselves to moths, but eat beetles which fly about in the evening; among others, some weevils, injurious to the flowers and buds of fruit-trees, as the *Curculio* (*Anthonomus*) *pomorum*, and *pyri*. These creatures, as they do no injury, should, therefore, be carefully preserved.

"To the insectivorous mammalia also belongs various sorts of mice, the mole, badger, hedgehog, squirrel, fox, and wild swine. Whether the benefits derived from them in this way counterbalance the mischief which many of these creatures cause, it is difficult to determine.

"Birds contribute much more than the mammiferous animals to the destruction of injurious insects.

"Many caterpillars know instinctively how to conceal themselves from the birds which prey on them; in many their covering of stiff hair acts as a protection against their enemies. Others remain all day between rolled-up or flatly united leaves, and only go out to feed at night. Others find sufficient protection in the buds, into which they soon penetrate. Gregarious caterpillars live while they are changing their skin, and when they are going into the pupa state, in webs, in which they are inaccessible to birds. Others live under the bark of trees, and even deep in the wood.

"Notwithstanding these and other obstacles, a great number are yearly devoured by the birds, particularly during the breeding season. In winter a multitude of birds, driven by hunger into the villages, diligently search the branches of trees for the eggs of many sorts of moths that are glued to them, and which yield a scanty sustenance to these frugal animals.

* * * * * * * * * * * * * * *

"It is a wonderful provision of nature that exactly at the same time that the insects, injurious from their great numbers, appear, the greatest number of the insectivorous birds have hatched their broods, and their voracious young are ready to be fed upon them.

"Insectivorous birds are also sometimes granivorous, and feast readily on our fruit, particularly cherries; but the injury they cause in this respect is not to be compared to the use they are of in destroying insects. At least we never hear of universal devastation caused by birds, though we do by insects.

"From what has been said, it will be sufficiently clear how strongly it should be inculcated by the authorities to forbid the capricious persecution of these useful birds, particularly in the breeding season.

"Among amphibious animals, which destroy insects, lizards hold a conspicuous place. Grasshoppers are the favorite food of many species. Frogs and toads also devour many insects.

"Besides mammalia, birds, and amphibious animals, nature, to restore the equilibrium among her creatures, and particularly to prevent the preponderance of some sorts of insects, makes use chiefly of insects themselves, namely those which feed upon others, and which by degrees obtain a superiority over those that are hurtful to us.

"Thus, many sorts of beetles, particularly of the family of ground beetles (*Carabidæ*), destroy a multitude of the pupæ of moths lying in the earth. Many flies, allied to our house fly, but much larger, lay their eggs in living caterpillars and destroy them. But the most useful are the Ichneumonidæ. The females of this numerous family, 1300 species of which Professor Gravenhorst has described in Europe alone, lay their eggs entirely in the bodies of other insects.

"The manner in which these Ichneumonidæ accomplish their work of destruction is highly curious and interesting, All the species are furnished at the end of the body with an ovipositor, composed of several bristles attached together, with which they pierce the larvæ of other insects, and introduce their eggs into the flesh of the wounded animals. In some this sting is longer than the whole body, sometimes more than an inch long, namely, in those species which seek the object of their persecution in the interior of trees or wood that has been much and deeply perforated by the insects which reside therein. They perceive, either by their sense of smelling or by their antennæ, that their prey is at hand, and introduce their eggs, not without difficulty, into the bodies of the larvæ living in the wood. Some attack caterpillars feeding openly on plants, others perforate the various excrescences, or gall-nuts, which also contain larvæ; there are even many species, scarcely visible to the naked eye, which lay their eggs in the eggs of other insects, such as butterflies, and thus anticipate their destruction.

"The eggs are hatched within the body of the living insect, and the young parasites, in the most literal sense, fatten on the entrails of their prey. At last the wounded caterpillar sinks, the enemies escape through the skin, and become pupæ; or the caterpillar, notwithstanding its internal parasites, enters the pupa state, but instead of a butterfly, one or more Ichneumonidæ appear. To these wonderful animals we often owe the preservation of our orchards, woods and grain.

"Besides the above-mentioned Ichneumonidæ, ants, field or tree bugs, and many sorts of spiders, contribute greatly in extirpating various insects.

"2. MEANS WHICH THE HUMAN UNDERSTANDING CAN OPPOSE TO THE DEVASTATIONS OF INSECTS.—Previous to taking any steps for the destruction of injurious insects, it is indispensably necessary that we should be perfectly acquainted with them and their economy, not only in their perfect state, but in all their different stages. For it might easily happen that we might destroy those most beneficial to our fruit and forest trees, and suffer their enemies to remain. I will give a single instance as an example. Entire heaps of small cocoons are seen on the bark of trees, often not larger than the eggs of many butterflies. The gardener or forester who does not know that these are the cocoons of the useful Ichneumonidæ, but considers them to be really the eggs of moths, rubs them off the tree, and thus annihilates his best friends. To people unacquainted with the economy of injurious insects, the choice of the means necessary for their destruction is perplexing. It is often impossible to take measures against the perfect insect, because it either withdraws itself from our observation, or lives in concealed corners, or only appears by night. We must, therefore, try to find where it lays its eggs, and whether anything can be effected against them.

Many moths lay their eggs in patches, in places easy of access, and in this case it costs us little trouble to destroy our enemies before they have done us any injury. I shall mention here the gipsy-moth (*Bombyx dispar*), which lays its eggs in large circular or oval spots on the bark of trees, or hedges, and covers them with a yellow wool. If we destroy these eggs, one heap of which often contains 300, in autumn or spring our fruit-trees will be secured from one of their most dangerous enemies.[*]

"It is equally easy to destroy in the egg the yellow-tail moth (*Bombyx chrysorrhœa*), which is no less injurious to our orchards. This moth lays its eggs on the leaves of the fruit trees in a long narrow heap, and covers them with gold-colored hair, which makes them very conspicuous. Pulling off and destroying these leaves secures the garden from another dangerous enemy.

"The satin-moth (*Bombyx salicis*), which not only attacks willows, but poplars, which it prefers, and strips our avenues almost every year, is very difficult to be extirpated in the larva state, as it spreads singly all over the tree. But when we know that the female in the month of July has laid her eggs like mother-of-pearl spots, chiefly on the bark of the poplar, a few ordinary laborers with their knives might loosen these eggs from the bark and destroy them.

"No effectual means can be taken against other insects except in their larva or pupa states, because they deposit their eggs singly, or in concealed places, or because it is difficult to distinguish them from the objects on which they are placed.

"It is impossible to destroy the dreaded processionary caterpillar (*Bombyx processionea*) in the moth state, because it flies in the night. It is almost as difficult to destroy its eggs, from their similarity in color to the oak bark, which prevents their being observed, and also from their being distributed all over the branches in small longish patches. The caterpillars, however, are gregarious; they sit in the day time on the stem or large branches, so that hundreds can be destroyed at a blow, by means of a wisp of straw, or a bundle of old rags. In the pupa state they are also easily destroyed, as they are usually found by hundreds in a nest, and hang like brown excrescences all over the trunk.

"The most essential and necessary means to be opposed to the serious injuries caused by insects, consists in the universal dissemination of the knowledge of the natural history of hurtful insects among farmers, gardeners, foresters, and particularly among those who are in any way connected with agriculture. This knowledge should be spread as well by verbal expositions in public institutions as by books easy of comprehension."

The Joint-Worm.

BY BENJ. D. WALSH, M. A.

Since my observations on the Joint-worm were printed in the second number of the PRACTICAL ENTOMOLOGIST, specimens of the same Insect that came under the notice of the *Canada Farmer*, have been obligingly forwarded to me by Mr. Riddell, of Cobourg, C. W.; and it is nothing whatever but the common Hessian Fly (*Cecidomyia destructor*, Say) in its "flaxseed" state. Hence, for any future investigation of this important subject, I must depend solely upon specimens sent me from other quarters. The two insects are readily distinguishable by the following criterion:—The Hessian Fly larva lies in the space between the straw and the shank of the leaf that enwraps the straw above each knot. The Joint-worm lies inside the straw itself, in a hard and more or less woody swelling just above the knot, or sometimes in the knot itself, or in the swollen and distorted shank of the leaf. Very frequently the Hessian Fly is imbedded in a deep cavity formed on the outside of the straw; but a little attention will soon show that this cavity does not penetrate the skin of the straw, any more than a bruise in an apple penetrates the skin of the apple.

Dr. Fitch devotes twenty-one pages of his recently published Reports (*6th—9th N. Y. Rep.* pp. 144—165) to this subject, without throwing much new light upon it, and seems to have changed his views somewhat, even during the printing of those twenty-one pages. On page 152 he says, "I must confess that now, when I come to cast over all the evidence which we have in relation to this subject, I feel less confident than I have been for a few years past, that this *Eurytoma* [i. e. *Chalcis* fly] is the real parent of the Joint-worm." But only twelve pages afterwards he adds—"I ought not to dismiss the subject without remarking, that I do not in the least doubt, that they [i. e. the *Chalcis* flies] are the real cause of the disease which we see in the grain." (p. 164.)

That Dr. Fitch, like the rest of us, is not infallible, is shown by the fact, that he throughout mistakes the well-known V-shaped or Y-shaped "breastbone" of the larvæ of the *Gall-gnats*, (or as he rather incorrectly calls them *Gall-flies*,) for a pair of jaws!! (See p. 150, &c.) Whereas his so-called "jaws" are not located on the head, but on the segment immediately behind the head; and further than that, the two prongs of the V or Y are perfectly immoveable and soldered together, instead of opening and shutting as real jaws would necessarily do. I have watched hundreds of these larvæ by the hour together, and know that in the same larva the two prongs always remain at the same angle with each other. If they were really jaws, although we might not be able to see them move, yet we should certainly find them at different angles with each other at different times.

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[*] A most satisfactory proof of the superior advantages arising from hand labor in the destruction of insects, has recently been given by M. V. Audouin, who was charged by a commission of the Académie des Sciences to investigate the habits of a small moth, whose larva is found to be exceedingly injurious in vineyards in France. During the month of August, women and children were employed during four days in collecting the patches of eggs upon the leaves, during which period 186,900 patches were collected, which was equal to the destruction of 11,214,000 eggs. In twelve days from twenty to thirty workers destroyed 40,182,000 eggs, which would have been hatched in the course of twelve or fifteen days. The number of perfect insects destroyed in a previous experiment by an expensive process was only 30,000.—See *Loudon's Gardeners' Mag.* for November, 1837.

A few Remarks on Silk-producing Lepidoptera.

The following particulars relative to the breeding in Japan of *Samia cynthia* Hübner, are gathered from a Dutch translation of a Japanese work on the subject, and may be interesting in view of the domestication of this silk-producer in the United States and its cultivation for commercial purposes.

In the Japanese tongue this insect is called "Yama-mayu," and is, in Japan, found wild on different species of oak trees, such as *Quercus sirocasi* Sieb., *Q. serratus* Thunb., and *Q. dentatus* Thunb. It appears to live on the ailanthus, *A. glandulosa*, in China, and, so far as we are aware, has been hitherto reared on this tree in the United States. It would be interesting to try our native species of oak as food-plants for the insect, since it appears that both the size and quality of the cocoons are affected by the different species of oak on which the larvæ are fed. It would appear that *S. cynthia* feeds also upon other trees than the oak in Japan, but that this is selected by silk-breeders on account of its leafing early in the season; the soft and delicate leaves also cause it to be preferred. Like our own "*Attaci*," *Samia cynthia* seems to be essentially polyphagous. For the purpose, then, of using the leaves for the rearing of the larvæ, oak trees are planted by the inhabitants around their farm-yards and along the borders of the fields, etc.; the cultivation of the silk-worm being very general by agriculturists in Japan, though not as a speciality, rather as a concomitant with general husbandry. Three methods are employed in rearing the silk-worms. By the first the worms are confined, though open to the weather, and fed on branches, the lower extremities of which are placed in water-jars. By the second the branches are merely laid on the ground, and by the third, the worms are reared on trees growing in the open air. The first method is necessary for the proper preservation of the young larvæ immediately on their exclusion from the egg. The young brood needs careful protection from the effects of the wind. The selection of the eggs is a matter of considerable importance. It is curious for us to read that the venders of silk-worm eggs in Japan in many instances endeavor to palm off imitation or manufactured eggs as genuine. The labor necessary to successfully imitate so frail and small an article as the egg of a moth, and that in quantities, is a surprising illustration of the cheapness of manual labor, as well as of the ingenuity of the natives of that country. In respect of color, the pale mouse-grey eggs are the best; the dark grey are of medium quality; on the other hand, the white eggs are unproductive.

In order to ascertain the quality of a lot of eggs, a few should be opened and examined. If the eggs are thirty days old, a small pale blue worm will be found developed in them. It is stated that the eggs of the *S. cynthia* differ from those of other silk-worms, in that the young larva can be detected, developed, on opening them. In opening the eggs, a razor or the point of a needle is used, while great care is necessary in order not to crush the contents. The best eggs are round, pale grey, and the heavier they are, the more vitality will be found possessed by the worms. A weight of 3,850 grammes of this quality of eggs will produce 101,000 worms.

The eggs of the middle sort are also round, but smaller. On opening the thirty days' old egg, the enclosed worm will be found but, unlike the worm contained in the eggs of the best quality, it will remain comparatively passive if undisturbed, while that contained in the first quality of eggs, under similar conditions, is violent in its movements, indicating greater vitality. The color of the worm of the middle sort is dark blue, thus differing from that of the first sort, than which it is also smaller. The poorest sorts of silk-worm eggs are not quite spherical, being depressed centrally. The larvæ are very small on exclusion and weak. Such are regarded as waste and thrown away.

On or about the 22d of April a space is cleared, in the open air, for the rearing of the silk-worms. Ants and other insects destructive to the larvæ, are carefully removed and destroyed, and the allotted space is surrounded by mats of native manufacture. In this place a wooden bench or form is erected, generally six feet in width, and long in proportion to the quantity of worms desired to be reared. Beneath this bench, which is open centrally, water-jars are placed, which are provided with covers having a circular aperture in the middle. Near the bottom of the jar is an opening and a stopper, to allow the water to be changed at will. The jars are generally placed three feet apart. On the top of the bench mats of very fine straw are laid, and the eggs are spread out on these. Every evening they are carefully examined. As soon as the hatching of the worms commences fresh water is put in the first jar, a hole is made through the mat above, and a few branches are inserted so that the stems may rest in the water in the jar beneath. On these branches small saucers of lacquered ware are hung, each containing a small quantity of eggs. These saucers have minute holes bored in the bottoms so that the rain water can easily escape. The worms, as they hatch, spread themselves from the saucers over the branches. When about 500 of these little caterpillars are thus placed on the branches, a second jar is brought into requisition and a similar process is continued. The opening in the mats, through which the branches are inserted, is well closed with leaves, etc., in order to prevent the caterpillars from falling through into the water beneath. One of the branches is also bent down so as to afford a means of ascent to the worms from the mats to the food.

When the worms have fed for three days on a branch, this needs changing for a fresh one. This is done by resting it against the fresh food, when the worms will quit of themselves the old branch. The worms are allowed from nine o'clock in the morning to three in the afternoon to make the change. After the expiration of this time, if any remain on the old food, which often occurs, the leaf or twig on which they sit is cut off and placed among the fresh food. Since the worms before their first moult are very small, it requires great care in shifting their food to prevent the loss or escape of any. The first period of their lives requires the most attention, and three persons are required to attend to fifteen broods of five hundred larvæ each, later on, the same number of persons can properly attend to three hundred of such broods. The water in the jars should be changed every other day. Generally speaking, the worms should be carefully managed, and any roughness when changing the food or the water in the jars should be avoided. Since they are more or less delicate, they should not be touched with the hands; their death has been known to ensue from later contact with their cast skins, which, in the first moultings, are more or less covered with hairs which subsequently disappear. As the worms increase in size so the number of broods and jars have to be added to; at every change of food the number of worms on any one branch is diminished by separation. As at first, five hundred worms were placed on the branches of each jar, so, after the fourth moult, this number should have been gradually diminished by separation until no more than fifty remain.

The tenth day after their exclusion from the egg the worms stop feeding and remain quiet for three days. This is the first moult. The moultings occur four times and, after the total lapse of sixty days, the worms begin to construct their cocoons; this period being hastened or retarded by climatical influences.

A. R. G.

Entomology all a Humbug.

Farmers sometimes complain that Entomologists have as yet effected so little, towards the counterworking of the hundreds of noxious insects, that are annually robbing the community of untold millions of dollars. But in the first place, there have been but very few Entomologists, who have been specially employed for this purpose either by the General Government or by the State Legislatures; and in the second place, some of those, who have been so employed, have had their time so entirely occupied with extraneous matters, that they have literally had no leisure whatever for the real duties of their position. Hear what Mr. Glover, the Entomologist of the Agricultural Bureau at Washington, says in his last Report:—

> As Entomologist of this department, besides the regular daily official duty, all the subjects of general natural history, such as insectivorous birds, specimens of fruits, textile materials, hemp, cotton, flax, &c., have been handed over to my charge for preservation and arrangement during the past year. (*Agr. Rep.* 1863, p. 561.)

This is a good deal like hiring a single cradler to harvest a thousand acres of wheat, and then expecting him, in addition, to cut and fetch in wood, peel and wash the potatoes, and be always on hand ready to wait on the good woman of the house. Can we wonder that, under such circumstances, Mr. Glover's Report contains scarcely any original investigations, and is in reality, like many similar Papers which appear from time to time in the Transactions of different State Agricultural Societies, little else but a re-hash of Harris and Fitch? When he should have been looking after the Bugs, he was set to work on the Birds; if he attempted an attack upon the Army-worm, he was called off to unpack a basket of apples; and instead of making war on the Chinch-bug, the Hessian Fly and the Curculio, his time was taken up with preserving and arranging specimens of hemp, cotton and flax!! Will our rulers at Washington never learn, that it is bad policy to put a square man into a round hole? And that, whether round or square, no one man can fit a hole that is as wide across as the dome of the Capitol?

W.

☞ Sew up your furs and woollen articles in muslin or linen bags, as a security against moths.

The Grape Vine Flea Beetle.

In spring, before the buds of the vine have burst, it will often be found, on examination, that the promised crop of grapes is destroyed in the germ, the buds having been bored to the centre, and in many cases almost scooped out by an insect. When this is the case, the vine-grower may bid farewell to all his anticipations of a remunerative yield of grapes; for the insect is pretty sure to select the best and most promising buds on which to make a repast, thus eating at a mouthful, as it were, two or three bunches of grapes. This little pest has become more numerous lately than it was a few years ago, for although indigenous on our wild vines, it is but recently that its ravages have extended to the vineyard. Now it may be found in great numbers in many of our city gardens, especially in the north part of the State [Ohio.]

Last year, the crops of several vineyards were entirely destroyed by it in that section, and near the shore of Lake Erie.

It is a beautiful little beetle, belonging to the old genus *Haltica* or flea-beetles, so called from their saltatorial powers, and is called the *Graptodera chalybea* or steel-blue flea-beetle. All, however, are not steel-blue, for some are of a brown tinge, and many of a beautiful green, violet or purple. But, whatever the tint, all have the same brilliant metallic lustre. The most common color is greenish-blue above, and dark green beneath; the hind thighs are thick and strong; the body of an oblong, oval form. Length about 0.16 of an inch.

This beetle issues from the ground during the first warm days in April, and immediately proceeds to attack the vine buds, eating its way to the interior, and devouring the entire centre. In May, the sexes pair, and the female lays her eggs in the leaves of the vine. When the young are hatched, they feed on the upper surface of the leaf, and if very numerous, soon devour the soft parts, leaving the leaf an unsightly object, covered with dirty brown blotches. They appear about the middle of May, and soon arrive at their full growth. The color of the full grown larva is light brown, with eight rows of black spots above, those of the two dorsal being confluent; head and feet black; antennæ very short. On each of the spots on the back there is a single hair, and from the breathing apertures two. Length about three-eighths of an inch. There are six true legs and a fleshy anal proleg; the under side of the segments are swollen, giving the appearance of short prolegs. When in motion, it brings its body up with a jerk like that of the caterpillars of the geometer moths. About the first of June, it enters the ground and changes to a pupa, emerging in from fourteen to sixteen days, as a perfect insect. There are several broods in the season.

The grape vine flea-beetle being a near relative of the dreaded turnip-fly *Haltica nemorum*, has nearly the same habits, with the difference of food. It is equally difficult to capture when in the perfect state, although much may be done during cool weather, even at that period of their existence, to thin their numbers by careful hand picking. The larvæ are rather tenacious of life, and will live through a hard course of treatment. When not numerous, the most certain method of shortening their days is to pick off the infested leaves and burn them; but this cannot be done when very numerous. I do not know any application not injurious to the vine, that can be easily applied and will kill the larvæ, but would recommend syringing with lime or very strong soap suds—that made from whale oil soap is the best; dusting newly air-slaked lime on the leaves when dry, will probably have a good effect. All these means are worth trying.—[*J. Kirkpatrick in Field Notes.*

[EXTRACT FROM A LETTER FROM DR. J. P. KIRTLAND, OHIO.]

Having succeeded in effectually checking the increase of the Bee-moth in my extensive Apiary, by a combination of agencies, I am encouraged in the belief that, by the exercise of a similar amount of care, and the employment of analogous aids, other species of depredating insects may, in many instances, be exterminated or counteracted.

Will you not be kind enough to furnish the readers of the PRACTICAL ENTOMOLOGIST with a detailed account of the agencies you employ in checking the increase of the Bee-moth?—EDS.

ACKNOWLEDGMENTS.

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Practical Entomologist.

A MONTHLY BULLETIN,

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E. T. CRESSON, AUG. R. GROTE, J. W. McALLISTER, } Publication Committee and Editors.
BENJ. D. WALSH, Rock Island, Illinois, Associate Editor.

PHILADELPHIA, MARCH 26, 1866.

☞ SPECIAL NOTICE. ☜

When the Publication Committee of the Entomological Society first discussed the propriety of issuing a practical Journal of Entomology, the question was debated whether a subscription price should be charged. Anticipating a limited circulation, and intending to devote a certain space for advertisements, the Committee reasoned that the journal would, by the receipts thus obtained, be self-sustaining, and should therefore be gratuitously circulated for the public good.

Under the laws of the United States, publications for which no charge is made are rated as circulars, and postage must be paid in advance of carriage; hence the rule adopted by the Committee for subscribers to forward the postage when sending their applications. This has been, as our readers are aware, the only charge exacted from them, and of course no benefit has accrued to the Society from such receipts.

From the beginning of the enterprize, we have been repeatedly urged by many of our subscribers to make an annual charge for our paper. The chief reason advanced by them is, that the information we give our readers, from time to time, is valuable, and should be paid for. This is a conclusive argument, but our plan, originally, was to disseminate a practical knowledge of Entomology among Agriculturists "without fee or reward."

To a limited extent we can do this, but so rapidly, and, we must confess, unexpectedly, has the circulation of our paper increased, that we find the expenses of our present issue to exceed considerably the receipts from advertisements, and thus entail a loss to be met out of the treasury of the Society.

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☞ Last month's number contained twelve pages. The present number is of the same size, and under our new arrangement we hope to be able soon to issue sixteen pages.

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ANSWERS TO CORRESPONDENTS.

M. S. Hill, Ohio.—The numerous white egg-like bodies, about one-eighth of an inch long, attached to the alcoholic specimen of the common Tomato-worm which you transmit, are not eggs but the cocoons of small Ichneumon-flies, belonging to the genus *Microgaster*. Their history is briefly this. The mother-fly punctures the body of the young Tomato-worm and deposits therein a number of eggs. These eggs hatch out into little footless maggots, and feed on the internal substance of the larva till they have attained their full growth, when they bore their way out and spin, each one for itself, a silken cocoon on the external surface of the now half-killed larva. In three or four weeks afterwards the perfect ichneumon-fly emerges from the cocoon, couples, and repeats the same operation in other larvæ. In Harris's *Injurious Insects* (p. 327) you will find a wood-cut of another kind of larva which has been attacked in the same manner, and of the perfect fly that is parasitic on it; and I have a specimen in my collection that is so completely covered by the parasitic cocoons, that no part of it can be seen but the head and the anal horn. It is a very common thing also to see different kinds of "span-worms" walking about with four or five of these parasitic cocoons attached to their bodies. In some of the specimens you send, the *Microgaster* is in the pupa state, and of a blackish color; in the rest it is still in the larva state and of a whitish color. If you had not immersed them in alcohol, they would have almost all changed in a few weeks into small, black flies.

The mass of similar egg-like bodies, which you found attached to a stem of grass, is nothing but the empty cocoons of a *Microgaster*, which had deserted the body of the infested larva before spinning up. In the Transactions of the Illinois State Agricultural Society I have described and figured a species which behaves in this manner towards the common Army-worm. (Vol. IV. p. 367 *Microgaster militaris*.) Certain species, before spinning their cocoons, unite all together in first spinning a mass of cottony, flossy matter by way of external protection; and this is the case with the Parasite of the Army-worm that has just been referred to. They are very common and abundant insects, and are of infinite service by checking the undue multiplication of plant-feeding larvæ.

B. D. W.

Thos. R. Payne, Iowa.—You send a thin, gauzy cocoon, about an inch long, with a large mass of white eggs attached to it externally, and glued together by a white foam-like substance. You found it, you say, fastened to the dead leaf of a pear-tree, and similar ones on apple-trees. It is the cocoon and eggs of *Orgyia leucostigma*, a very common moth which lays its eggs, not only on fruit-trees, but on a great variety of forest-trees. The female moth has nothing but the merest rudiments of wings—as is also the case with the notorious Canker-worm—and always lays her eggs on the cocoon in which she emerged from the pupa state. The male moth has full-sized wings, and is therefore able to fly round in search of the female. The larva is one of the most beautiful objects in nature, and has a coral-red head and long pencils of black tufted hairs before and behind. You will find colored figures of the larva, of both sexes of the moth, and of the cocoon and eggs, in *Harris's Inj. Ins.*, Pl. 7, fig. 1—5. B. D. W.

O. Cook, Mass.—What you take for a "package of eggs," one of which packages happened to be attached to the eggs that produce the common apple-tree caterpillar, are not eggs but cocoons. From a very similar mass of cocoons we have bred a rather rare species of *Microgaster*, and yours undoubtedly belong either to that or some other species of that genus, which is a very extensive one and comprises very numerous groups. They are all parasitic insects, belonging to a sub-division of the great family of *Ichneumon*-flies, called *Braconidæ*; and instead of destroying them, you should cherish them as the very apple of your eye. But for the different kinds of *Ichneumon*-flies, leaf-eating insects would soon increase to such a prodigious amount, as to devour every green thing on the face of the earth.

As to the "little cocoons which you find in large numbers on your apple-trees," either you failed to send any, or they have by some accident been lost or mislaid. There is nothing to be seen now in your package, but two of the well-known masses of eggs that produce the common caterpillar, and the mass of cocoons above spoken of. Please send more, and we will endeavor to tell you what they are. As you say they occur in large numbers, send plenty of specimens.

Geo. E. Brackett, Maine.—The common "caterpillar" of the apple tree occurs on several forest-trees, as well as the cultivated apple and cherry tree and the wild cherry, plum and crab. We have frequently noticed them on willows, and Dr. Fitch found them on witch hazel and poplar. You say that you found a belt of the egg on a twig of yellow birch. When, as in 1865, these catepillars are so exorbitantly numerous as to strip the trees which they usually inhabit, they then disperse and seem to feed almost indiscrimately upon any tree that comes handy to them.

You are quite right in regard to the specimen sent. It is the pupa of the common "caterpillar" of the apple-tree, which has been parasitically infested by two or three *Tachina*-flies, that have constructed their cocoons (puparia) inside its body. *Tachina* is a family of two-winged Flies (*Diptera*), many species of which closely resemble House-flies and Flesh-flies, but may be distinguished by the bristle of their antennæ being smooth and not feathered. Their cocoons (puparia) are not spun out of silk, as are those of the *Ichneumon*-flies, but are composed of the dried-up and shrunken skin of the larva, and are generally of a shining mahogany color *with the joints in the body of the larva still plainly perceptible.* The larvæ found inside one of these *Tachina* cocoons are, as you rightly suppose, parasites upon the parasite, and many similar cases have been recorded by authors. As they have spun cocoons, they probably belong to the *Proctotrupes* and not to the *Chalcis* family; but it is impossible, without rearing the perfect insect, to say to what species or even to what genus they appertain, and we may make the same observation with regard to the *Tachina* fly.

Authors have generally supposed that while the primary parasitic larva is still feeding inside the body of its victim, it is punctured by the secondary parasitic fly, and has one or more eggs deposited in its own body, which afterwards hatch out and gradually destroy it. Certain facts with which we have been acqainted seem to be explainable only on that hypothesis; but Dr. Fitch infers that it is only after the primary parasite has issued from the body of its victim that it is punctured by the secondary parasite. Very possibly this may be the case sometimes, and sometimes the former supposition may be the correct one.

Wm. A. Woodward, N. Y.—The twig from a peach-tree which you send contains the eggs of some Homopterous Insect, perhaps a *Cicada*, or, as it is commonly called, a "Locust." Without breeding the insect from the egg, it is impossible to speak with more precision, as the eggs of the whole group resemble one another very closely. Their size is the only reason we have for supposing them to be the eggs of some species or other of *Cicada*. They are not the eggs of the "17-year" *Cicada*, because those are said to be deposited in a double row, and yours are in a single row.

☞ The various sorts of grain are, from the moment when as seed they are committed to the earth, till they have attained their perfect maturity, exposed to the attacks of various sorts of insects. The farmer, who is entitled to expect a plentiful crop from the soil and favourable weather, often finds his hopes disappointed, without being able to guess at the cause. An insect, which escapes his notice from its minute size, as well as from the difficulty of finding out its abode, is at work destroying the fruit of his labours. The agriculturist, who is unacquainted with the economy of insects, seeks in vain for the author of this destruction, and not unfrequently attributes it to creatures which, in reality, are his benefactors. Thus it happens that many birds are scared away from our fields, whose principal nourishment consists in insects; and that moles, which live entirely on the larvæ of insects lying in the ground, are hunted out and destroyed. —*Köllar.*

[From the Journal of Commerce.]

Apple-tree Borers.

The *Practical Entomologist*, published gratuitously, at Philadelphia, is, so far, worthy of high commendation. It contains a great deal of just the kind of information which farmers, horticulturists and nurserymen need, without any mark of selfish motives. We hope it may receive such encouragement, by advertisements or contributions, as will enable it to enlarge; for it is too small for a monthly devoted to so important a science. The last number is occupied by a treatise upon borers, by Benj. D. Walsh, of Illinois. His account of the species of apple-tree borer which is most common in the Eastern and Middle States (*Saperda bivittata*), is the best which we have seen. Nevertheless, our familiarity with this pest warrants us in taking exception to one or two statements. We have literally seen thousands of them; while Mr. Walsh says it is the Buprestis borer (*Chrysobothris femorata*) that prevails in the Mississippi valley, and the other species does not exist in his neighborhood. We conclude, therefore, that the slight errors into which we think he has fallen, are copied from others whose accuracy is not equal to his own.

We do not believe that the larva, "as it approaches maturity, strikes off into the heart wood." On the contrary, its movements seem to be confined to the sap wood unless there be some particular reason for leaving it. In small trunks or roots, it does not get room enough without encroaching upon the heart; and, when crowded out from one side of a tree, by the holes of its neighbors or predecessors, or by the occurrence of dead wood, it may strike through the heart to another location. Its last and largest cavern must be excavated near the bark, as otherwise the beetle into which it changes would be unable to escape.

We do not think that this borer ever opens a hole, "in order to get rid of his castings." We have found them, in every stage of their existence, without any opening whatever to the outer air. They crowd certain parts of their excavations with chips. We opine that, where the covering is thin, cracks are opened by the swelling of these chips when moistened. They seldom occur except at the time of sap rising in early spring. We may allow, indeed, that, when these cracks have once been formed, fresh chips are often forced out at them, but they are evident rents and not gnawed holes. The hole at which the beetle escapes is readily distinguished from them by being higher up the trunk and circular, as if made by a small bullet. There can be no more absurd truism than was uttered at one of the meetings of the American Institute Farmers' Club, to the effect that it is as well to plug these holes up as to cut them open. Of course, after the horse is stolen, it does just as much good to tie up the halter as to lock the stable door.

Remarks, by B. D. W.—The author of the above is correct in surmising that I have no personal acquaintance with the habits of the Two-striped Borer. But Dr. Fitch, who is well acquainted with this insect, asserts as follows of its larva:—

> It takes up its abode in the sapwood, feeding upon and consuming the soft wood, hereby forming a smooth round flat cavity, the size of a dollar or larger, immediately under the bark. It keeps its burrow clean by pushing its excrement out of a small crevice or opening through the bark, which it makes at the lower part of its burrow, and if this orifice becomes clogged up it opens another. This excrement resembles new fine saw-dust, and enables us readily to detect the presence of the worm by the little heap of this substance which is accumulated on the ground. * * * When the worm is half-grown or more it gnaws a cylindrical retreat for itself upwards in the solid heartwood of the tree. This hole runs slightly inwards, towards the centre of the tree, and then outwards, so that when it is completed its upper end is perforated through the sapwood and is only covered by the bark. (*N. Y. Reports*, I. pp. 14—5.)

Subsequently Dr. Fitch modified the above statement, so far as regards the larva's opening a hole for itself in early life in order to get rid of its castings, as follows:—

> The cavity [under the bark] is almost invariably found stuffed full and densely packed with the saw-dust like castings or chips of the worm, a small quantity of which is commonly protruded to the outside of the bark, sometimes through a natural crack formed by the bark becoming dead, dry and contracted, sometimes through one or more small orifices which appear to be gnawed by the worm. But I have met with many instances where none of this powder was protruded, the blackened and slightly depressed surface of the bark being the only indication of the mischief that was going on beneath. (*N. Y. Reports*, II. pp. 4—5.)

From what I know of the habits of allied insects, I incline to believe that the *Journal of Commerce* is right in asserting that this larva never purposely opens a hole in order to get rid of its castings, and that Dr. Fitch is right in asserting that, in the latter part of its larva life, it bores into the solid heart-wood.

THE CHINCH BUG.

An article appeared some time ago in the Waukegan (Ill.) Gazette, from the pen of D. H. Sherman, of that place, claiming that he had made a discovery by which farmers, if they but followed his advice, could readily protect their grain from the Chinch Bug. The discovery was, that the eggs were deposited by the parent bug in the "fuzzy" or blossom end of the kernels of grain, and consequently, by properly manipulating the seed and destroying the eggs, the future ravages of the bug would be prevented. To those who knew anything about the habits of the insect, the idea appeared absurd enough, and it was generally unnoticed. The article has, however, been extensively copied without remarks, not only by some political papers, but by many of the widely circulated Agricultural journals in the country, and I feel constrained to rectify any impression that the readers of the Practical Entomologist may have derived from it.

This is the more necessary since the article in question must be quite plausible to those unacquainted with the insect, and also because it was observed by reliable persons that the Chinch Bug, in many parts of this State, was quite scarce late last Fall, and that comparatively few went into winter quarters to hybernate. In some sections also there has been but little snow, and the winter has been unfavorable to the bugs, and should the weather also prove unfavorable to their increase next summer, and the grain be free from their ravages, the result would be immediately attributed to the destruction of the eggs in the seed wheat by those who soaked their grain in whatever mixture with the expectation of such a result, and the assertion of Mr. Sherman would thus gain a credence which might require years to eradicate.

By a few plain facts, therefore, I intend briefly to prove the falsity of this assertion. Mr. Sherman tells me he thinks he has a perfect right to advance this *theory*. In Natural History there should be no theory, for it is a study of observation, and the little history of each individual animal is a fact rather than a theory. That of the Chinch Bug may be set forth as follows: In Spring, when the grain has started, those which have hybernated sally out into the fields and attach their eggs to the roots of the young grain wherever they find crevices and uneven surfaces which afford access to them. These eggs are yellow, and not so extremely small but what they may be readily seen with a little scrutiny. As they mature and the young bug is about to hatch, they acquire a deeper yellow or reddish tinge, and presently the little red fellow escapes, and in course of time becomes a perfect insect. They then pair and provide for another generation, which attains its full growth as Winter approaches, and soon seeks its Winter quarters. Thus there are two generations here, although in a more southern latitude, where the Summer season is longer, there may be three or four.

This is the simple history of the Chinch Bug, as all who have observed it know full well, and although this communication might be greatly extended with further proof that the eggs are not deposited in the wheat kernels, I deem it quite unnecessary so to waste time and space. The simple truth is proof enough, and to make assurance doubly sure I wil state, that by request, Mr. Sherman sent me some of the wheat said to be infested with the eggs, and after thoroughly examining every grain with a powerful microscope, and after submitting them to others for examination, we have concluded that Mr. S. must have been laboring under a delusion, for no trace of eggs of any kind, or of anything that had the remotest semblance thereto, was to be found; therefore, without advising farmers to discontinue steeping their grain in brine or other solutions, (for they doubtless give the young plants a vigorous start) let them understand clearly, that they do not kill any Chinch Bugs by the operation, and they should therefore rather rely on the more sensible means of burning all the grass, cornstalks, weeds, etc., on and around their fields, before the ground is thawed out, and of rolling the ground when the grain is in. C. V. RILEY.

CHICAGO, ILL., March 5, 1866.

BLACK-KNOT.

BY BENJ. D. WALSH, M. A.

What is Black-knot? It is a black, puffy, irregular swelling on the twigs and smaller limbs of Plum and Cherry trees, and, in one instance that came under my personal observation, of Peach-trees, making its first appearance in the latitude of New York early in June and attaining its full growth by the end of July. Usually a tree that is attacked in this manner is affected worse and worse every year until it is finally killed, and wherever one tree of a group is affected, the malady usually spreads to them all in process of time. In 1865 whole Cherry orchards were destroyed in Western New York by this disease, and I have myself seen many groups of wild Plum trees in Illinois that were gradually perishing by it; but in Southern Ohio, as I was told some years ago by the well-known pomologist, Dr. Warder, the Black-knot is never met with. In the Eastern States it has been observed for time immemorial, and various contradictory opinions have been broached as to its real nature and origin.

In 1865 I watched the Black-knot carefully through all its stages, from its earliest commencement to its complete maturity, experimenting at the same time on numerous specimens collected week after week, so as to ascertain what insects bred in it. The practical conclusion I have arrived at is simply this:—*If the diseased twigs are all cut off and destroyed early in July in the latitude of New York,* *or a little earlier or later according to the latitude, taking care to cut a few inches below the affected part, the Black-knot can be checked and probably entirely eradicated; but if this operation is delayed till August, it will be of no benefit whatever.* Hence we can easily account for a circumstance which has puzzled many men wonderfully, viz: that cutting off and burning the diseased twigs is pronounced by some to be a sovereign remedy and by others to be a delusive humbug. Those that do this early enough, find it effectual; those that delay it till too late, find it of no use.

This perhaps will be sufficient for some few impatient souls, who take everything upon trust that they see in print, and care nothing about the *rationale* of a mode of treatment, so long as it be practically available. But for the benefit of that large class of intelligent Agriculturists, who have been deluded by too many quack prescriptions to place much faith in any man's *ipse dixit*, and who in any case like to understand the principle of a remedy before they apply it, I subjoin a full account of all that is at present known on this subject, and of the different theories respecting it entertained by different writers. There exists an American edition of Euclid's "Elements of Geometry," with all the demonstrations omitted bodily. Those whose taste lies that way, and who prefer assertion unaccompanied by proof, can skip the rest of this article.

Three radically different theories have been broached as to the nature and origin of Black-knot: 1*st*, that it is a mere disease of the tree like the cancer or the gout in the human race, which is the view maintained by Dr. Fitch, the State Entomologist of New York; 2*nd*, that it is what naturalists term a "gall," produced by some unknown insect depositing its egg in the twig—just as the well-known "oak-apples" are produced by a Gall-fly (*Cynips*) depositing its egg in the bud of the oak—which is the opinion that I myself formerly held and maintained, before I had fully examined into the subject; (*Proc. Ent. Soc. Phil.* III. pp. 613—618;) and 3*rd*, that it is what Botanists term an Epiphytous Fungus, growing on the tree as a mushroom or toad-stool grows on the ground, which is the opinion of the botanist Schweinitz, and which has recently been re-asserted by Mr. Glover, the Entomologist of the Bureau of Agriculture at Washington, though without adducing any proof of the fact. (*Agric. Rep.* 1863, p. 572.) This last is the opinion which, upon full enquiry, I have now adopted.

Before discussing these theories, the facts arrived at by myself in the summer of 1865 must first be briefly noticed. It should be premised that the old, dry Black-knot remains on the tree for many years, and that the place to look for new Black-knot is on such trees as have been already attacked and are loaded with old Black-knot, without being as yet completely killed by it.

1*st.* By the middle of June the new Black-knot is pretty well developed, and may then be readily distinguished from the old by its dull, opaque, brown-black color, while the old is coal-black and more or less glossy. When cut into, it is found to be fleshy inside, like an apple, but not juicy, and of a pale greenish-yellow color, with fibres radiating from the axis of the twig, while the old Black-knot is internally hard and woody, and of a reddish-brown or rust-red color. The brown-black color of the external surface is retained till the last week in July, when the surface of the new Black-knot becomes gradually covered all over with little, coal-black, hemispherical plates, about the size of the head of a pin, each of which is a distinct fungus, named long ago by Schweinitz "Sphæria morbosa." Even on the old Black-knot this fungus may be readily seen, at any time of the year, covering its entire surface. So far I have added little to the information already published on this subject, except by the specification of dates. But in addition to these facts, I discovered that about the last of July or the first week in August, there grows from each fungus on the surface of the Black-knot a little cylindrical filament about one-eighth of an inch long, which no doubt bears the seed or "spores" as they are technically termed of the fungus, and that these filaments very shortly afterwards fall off and disappear, leaving behind them the hemispherical plates, which alone had been hitherto noticed by the Botanists. In another Epiphytous fungus, which grows commonly and abundantly in Illinois on the Red Cedar, but which differs from the Black-knot in being attached to the twig by a very short stalk or peduncle, and in being roundish and externally of a reddish-brown color instead of elongate and black, there is a precisely similar phenomenon; except that the plates and filaments are very much larger, and that each filament when it falls off leaves a ragged scar behind it. In a single specimen of Black-knot noticed August 6th, I discovered that the filaments not only covered the entire surface of the Black-knot itself, except where a few of them had already fallen off, but that they were thinly studded over the twig for an inch or two above and below the swollen black part; thus proving that the fungus sometimes extends rather further than on a cursory view it would appear to do. Towards the middle of August, the new Black-knot, having perfected its seed, gradually dries up and becomes internally of a reddish-brown color. In other words, like so many other annual plants, it dies shortly after it has perfected its seed, just as a stalk of wheat or of corn dies shortly after the grain is ripe.

2*nd.* During the months of June and July I collected from time to time very numerous specimens of Black-knot, some of which I cut into to see what larvæ they contained, and some I preserved to see what perfect insects could be bred from them. Besides seven specimens of the common "Curculio," which many persons had previously bred from Black-knot, I bred for the first time therefrom no less than five distinct species of insects,* none of which can be considered as gall-makers, but not a single true gall-maker; and I can confirm Dr. Fitch's assertion, that some specimens are wholly free from larvæ of any kind when cut into.

We will now take up in order the three different theories respecting the nature and origin of Black-knot, which, as already stated, have been maintained by different writers.

1*st. That Black-knot is a mere disease like the cancer.*—Dr. Fitch, who maintains this opinion, allows that the black granules found on the Black-knot are a true fungus, "that the surface of these excrescences, when mature, is always covered with this plant," and tnat "this plant never grows, or at least has never been found, in any other situation." (*Address N. Y. State Agr. Soc.* 1860, p. 21.) Yet, in support of his peculiar opinion, he argues as follows:—"What is a fungus? To express it in familiar language, it is a body which grows and forms its own substance, distinct from and independent of the body in which it takes root and from which it draws its sustenance. Now these Black-knots are not such a growth. They are merely a change in the texture of the natural parts of the limb." (*Ibid.* p. 22.) According to this definition of the term "fungus," what is commonly called "mould" in a loaf of stale bread is not a fungus, because it is not "distinct from and independent of the body in which it takes root;" and on the other hand, an apple or a peach must be a true fungus, because it is "distinct from and independent of" the apple-tree or the peach-tree. But leaving the Botanists to settle the validity of this definition, surely if, as Dr. Fitch concedes, the Black-knot and the fungus are always found in company and never by themselves, the one must be part and parcel of the other; otherwise we might naturally expect, if not to find the fungus without the Black-knot, at all events to find occasionally the Black-knot without the fungus. In reality a Black-knot is an assemblage of funguses, just as a tree is an assemblage of buds; and just as each Black-knot fungus is a distinct individual, so many Botanists are of opinion that each bud in a tree is a distinct individual, the tree itself being merely the stock upon which the individual buds grow, as the Black-knot is the stock upon which the individual funguses grow.

2*nd. That Black-knot is a gall.*—As already stated, there is no true gall-making insect that inhabits the Black-knot, so far as I can discover on the fullest and most extensive investigation that I have been able to give to the subject. The minute holes, commonly found in the old dry Black-knot, which are too large either for the "Curculio" or for the small moths bred by myself from Black-knot, are of a suitable size for either of the two Dipterous insects which I have enumerated in a note as bred by myself from Black-knot. Consequently the argument which I based upon the existence of these minute holes (*Proc. Ent. Soc. Phil.* III. p. 614) falls to the ground; and although I found on one occasion the larva of a Gall-gnat embedded in a cell in a Black-knot, yet this was most probably that of the Guest Gall-gnat which I actually bred from Black-knot, as stated in the note, and not of a true gall-making Gall-gnat.

3*rd. That Black-knot is a fungus.*—Just as Dr. Fitch, having proved to his own satisfaction that Black-knot is neither a gall nor a fungus, infers by the method of exhaustion that it must be a disease; so, having proved that it is neither a disease nor a gall, we may infer by the method of exhaustion that it must be a fungus, or rather an assemblage of funguses. In confirmation of this theory may be adduced the very remarkable analogies, between the structure of the Black-knot and that of the fungus described above as occurring on Red Cedar. That

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*July 21, *Ceratopogon*—(determined by Osten Sacken.)—Aug. 23, *Cecidomyia* (*diplosis*) *septem-maculata* Walsh, (also inquilinous in a Willow-gall.)—Aug. 25—Sept. 27, three distinct new species of *Hedya?* (Microlepidoptera) expanding .35—.40 inch.—July 22—Sept. 24, *Conotrachelus nenuphar* ("Curculio.") I strongly suspect that *Sigalphus curculionis* Fitch is parasitic, not as Dr. Fitch supposes upon the "Curculio," but upon some of the minute moths that inhabit the Black-knot, because I have bred other Cryptogastrous Ichneumon-flies from Willow-galls, in which small moths, including two distinct new species of *Hedya* described by Dr. Clemens, are very commonly inquilinous, and the authors of which, being *Cecidomyia*, could not have been infested by an Ichneumon-fly. For, so far as my experience extends, *Cecidomyia* is infested only by *Chalcididæ* and *Proctotrupidæ*.

this last is really and truly a fungus and not a gall, is shown by the fact, that it is scarcely ever inhabited by insects; for out of hundreds of specimens that I have cut into, both green and dry, not more than two or three contained the larvæ of moths, but one contained what was probably the larva of an ichneumon-fly, and all the rest were perfectly solid and unbored. On the other hand, Black-knot is so infested by insects, that it is almost impossible to find a mature specimen that is not all bored up by them. The cause of this remarkable difference may be attributed to the well-known repugnance of almost all kinds of insects for Red Cedar.

If, then, Black-knot is a Fungus, and if, as I think I have shown, it is an annual plant propagating itself by seed or the so-called "spores," and the "spores" make their appearance about the end of July in latitude 41° 30′, then it must be obvious that if all the Black-knot on a particular tree is cut off and destroyed in the fore-part of July in latitude 41° 40′, or a little earlier or later as you go further south or further north, an effectual stop will be put to its further propagation. It is true that the "spores" are in the form of an impalpable powder, so that they may be carried some considerable distance from other infected trees by the wind; and it may possibly be further true, that certain "spores" may lie dormant in the bark for over a year, as the seeds of weeds will often lie dormant in the ground for over a year. Still, with all these possible drawbacks, I have little doubt that the above remedy will, as a general rule, if applied according to directions, be found effectual.

I have only, in conclusion, to apologize to Messieurs the Botanists for stealing their thunder by writing about a fungus. The truth of the matter is, that I really did for a long time mistake a Fungus for a Gall. If, however, any Botanist requires further atonement than my humble apologies, he can in his turn mistake a Gall for a Fungus, and publish just as tedious an article as this in illustration of its Natural History.

ROCK ISLAND, ILL., March 5, 1866.

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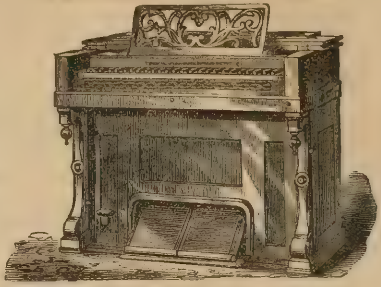

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Vol. I. APRIL 30, 1866. No. 7.

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PHILADELPHIA, APRIL 30, 1866.

THE STUDY OF ENTOMOLOGY.

We are glad to record as one of the results of the teachings of our paper, a desire with many of our subscribers to study the beautiful branch of Natural Sciences, Entomology. Why this branch is so much neglected we are at a loss to know. While other departments have their attractions, the same facilities for study do not exist as in Entomology. Every city and town, every field and wood in the country, present at the proper season opportunities for the study of the habits and capture of specimens of insects. What farmer's boy has not chased, in the dusk of evening, the "lightning bug" or "fire-fly," or those beautiful moths (*Sphingidæ*) that fly at night, and in the obscurity are taken for humming-birds, and what country house is there without its "butterfly" impaled upon a pin and placed in some prominent place for the admiring gaze of the youngsters?

Habits formed in youth are hard to shake off, and to those of our readers who have been or are boys, and have indulged in this apparently childlike amusement, we would say be boys again in so far as capturing insects is concerned, but bring the wisdom of your manhood into play, and study the habits, the localities, the structure and formation of the beautiful and delicate objects that make up the insect world. We know it will repay you.

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The rooms of the Entomological Society are opened for visitors every week-day, and such of our correspondents and friends as desire to compare specimens or view our collection will be welcome.

THE MEASURING-WORM.

(*Ennomos subsignaria.*)

As the warm weather approaches and the measuring-worm makes its appearance upon the shade-trees in our city, much discussion will ensue as to the best remedy to apply, that the destruction of this abominable pest may be final and complete.

The natural history of this insect is briefly this:—From the cluster of eggs deposited upon the trunk and branches of the tree last summer, by the female moth, a brood of small caterpillars come forth, as soon as the buds begin to expand into leaves, which soon crawl to the upper branches and scatter about the young shoots in the tree-tops, where they live quietly and unobserved for a week or so. They increase in size and voracity with the growth of the foliage, and, when about half-grown, they become more conspicuous, and commence their saltatorial exercises, which latter are continued until they have attained their full growth, previous to their transformation into the chrysalis state. In the heat of the day they delight to suspend from their threads, but as night approaches they spin up into their homes in the tree branches. The caterpillar sheds its skin several times, and finally, when fully fed up—towards the end of June—it undergoes its transformation into the chrysalis state, in an open net-work which it constructs among the half-eaten leaves. It remains in this state about a week, when the insect emerges from its cocoon, transformed into a moth of a beautiful satiny-white color, which may be seen, about the first week in July, fluttering, in the dusk of the evening, about the trees. Both sexes are provided with wings, the males being distinguished from the females by having feathered antennæ—a pair of organs attached to the head. After pairing, the female moth lays her eggs, in clusters of fifty or more, upon the branches of the trees, to hatch out next spring.

The scientific name of this moth is *Ennomos subsignaria*, Hübner, and was described and figured many years ago. It may be found solitary and rarely in the woods, not far from the scenes of its ravages, where birds and predacious insects exercise their mission of preventing excessive production unhindered by man. But birds avoid crowded cities, and the effort to colonize them in our public squares, so far as their ability as exterminators of the worms is concerned, has failed; being thus almost entirely relieved of their natural enemies, they have been allowed to "increase and multiply" to an unlimited extent. For more than a month in early summer our most beautiful shade trees are defoliated, and localities rendered almost impassable by the suspended worms. In fact, the nuisance has increased to such an extent, that stringent measures must be adopted to relieve the public.

Many remedies have been suggested, which, if universally applied, would do much to mitigate, if not effectually stop, the evil. Syringing the trees with a solution of whale oil soap has been suggested, but such a remedy appears to be too expensive, and therefore impracticable. Several of our daily papers, in warning their readers of the reapproach of the nuisance, suggested a remedy by scraping the eggs of the moth from the branches and the twigs of the trees. This would do if it could be effectually done; but how are we to reach the small twigs of the topmost branches? The effect of clearing only that portion of the tree readily reached would be scarcely observable, when the eggs are hatched, and the caterpillars are dangling in the air apparently as numerous as ever. And again, some citizen, with a laudable desire to do his share of the work of extermination, may cleanse his trees thoroughly, while his neighbors on either side for some distance, do nothing, and the labor of this good citizen is lost, as the moth from his neighbors will in due season deposit eggs upon his trees, to be hatched the next season. Some of our citizens cut down their trees as the shortest method to get rid of the worms, but this is a poor plan, for, if followed, every infected tree must bow to the axe, and the whole city be left without shade.

If we desire to effectually get rid of this nuisance, we must go to work in earnest, and the work must be done thoroughly and universally. We therefore suggest that Councils pass an ordinance compelling every householder to keep the trees on his premises clear of the worms, in the same manner that they are compelled to clear the snow from the sidewalks in winter, and refrain from washing them during certain hours in the summer. We think this will be effective, since it will be an united effort of the people for the common good.

A good plan of ridding the trees of the worms is the following:—At midday, or during the hours of warmest sunshine, when the worms are most active, a sudden jar with a mallet or a vigorous shake of the trees, will dislodge and bring down hosts of the insects, and those suspended by their threads can be easily swept to the ground by a pole, and then instantly killed. This operation, repeated three or four days in succession, will most effectually clear away the worms from the trees. In some cases it may not be possible to discover and destroy all the worms that have come to the ground, especially beneath large trees growing among grass, but the increase will certainly be checked, and if this plan is carried out for two or three years in succession, the insect will become as rare in the city as it is now in the country, where it has its natural and most powerful enemies to contend with.

To depend on the destruction of such small objects as the eggs, which might readily escape our observation, or on the destruction of the insect after it has transformed into the moth state, (and, for aught we know, had already deposited her cluster of fifty or more eggs in some safe place) as an effectual plan for the extermination of the pest, seems to us to be folly. We must attack the caterpillar or worm itself, for it is easily seen and destroyed, and then we are sure that it can never reach maturity to propagate the nuisance for another year; whereas, if allowed to perfect its transformation, it may be the means of founding a colony of fifty or more worms the next spring.

A FEW REMARKS ON SILK-PRODUCING LEPIDOPTERA.

Our excellent friend, Dr. John G. Morris, of Baltimore, who has written very ably on the Ailanthus silk-worm, *Samia cynthia*, Hübn., in the Smithsonian Reports, informs us, that the Japanese or Oak silk-worm is a distinct species, as he has learned through his correspondence with European Naturalists. In the work, however, from which we have compiled our account of the native treatment of the Japanese worm, the species is called *Saturnia cynthia*, a determination which we now believe to be erroneous. The generic name *Saturnia* does not belong to *S. cynthia*, but is used by those naturalists who would incorrectly refer nearly all the species belonging to the Bombycid sub-family *Attaci* to the European genus *Saturnia*. The narration of the Japanese manner of treating their "oak-worm," will perhaps furnish us some hints in breeding our native *Attaci* for silk-producing purposes, since the habits of all these species are analogous, and *Platysamia cecropia* and *Telea polyphemus*, (probably our most available silk-producers) will be found subject to similar conditions of life with their Asiatic sub-family associates.

We therefore continue our remarks on the treatment of the "oak-worm" for silk-producing purposes, in Japan. —After the third moult of the larvæ, these can be transferred to trees in the open air, to complete their transformation in a state of nature, as it were, instead of continually keeping them in confinement until they spin, as we have described in our last article. The place selected for this open air treatment of the larvæ should have been already, during the preceding year, cleared of weeds and grass, as well as of such kinds of trees that are inapplicable for the purpose. The trees that are to be used are deprived of all their high branches so that, when trimmed down, they do not much exceed eight feet in height; this is for greater convenience and security, and enables a person with merely the assistance of a stool or bench to reach the larvæ at all times.

If such a place is selected in the vicinity of dwellings, care must be taken that smoke or offensive smells do not come in contact with the larvæ, as these are very susceptible and badly affected by such and similar influences. It is also stated that the blowing of horns, the ringing of bells, and the beating of drums in their immediate vicinity, affect the larvæ adversely, and is to be avoided. In Japan, where, if report be true, so much of this kind of thing is forever going on, on the slightest or no pretence at all, this advice is no doubt seasonable and timely. The larvæ are easily transferred to the trees by tying the twigs on which they sit, and have hitherto been reared, to the branches, when they readily transfer themselves to these latter. For protection from ants, a native preparation is smeared on the trunks of the trees. For the first three or four days care must be taken to prevent the access of *ichneumonidæ*, or wasps, since it is found that, if no care is taken to avoid their attacks at first, the first comers bring afterwards swarms of their fellows, and a consequent demolition attends the brood. Bird-lime is used as a preventive of the attacks of ichneumon wasps. The depredations of birds are avoided by fastening sticks to the highest branches of the trees, from which depend white strings with strips of white paper attached to them. Old nets of various kinds are also thrown more or less completely over the trees, and are found of use in protecting the larvæ against their various enemies. To a tree of say ten feet height, an allowance of fifty larvæ is given; its leafiness is, however, naturally taken into consideration. The care of a single person suffices for a plantation of this kind, but it requires the early attendance of such a one, since the birds, etc., choose principally the early morning for their visits. As soon as the cocoons are formed, the twigs to which they are fastened are cut off with scissors and they are then carefully hung on extended lines. They are taken from the trees thus early, in order to avoid the depredations of field and wood-mice, foxes and crows. It often happens that some cocoons are left hanging on the trees without being collected; the moths which in due time escape from these become the parents of a fresh brood of larvæ as in a wild state. In this way a plantation is frequently self-sustaining for a longer or shorter period of time. On the Island Kin-sin, and in certain districts of Nippon, the "oak-worm" occurs in its natural or wild state, and there are many villages in which the principal occupation of the women and children is to gather its cocoons in the bushes, a business in which a good deal depends upon luck, and which has at times yielded Japanese fortunes to a lucky poor person or servant. Owing to the peculiar leafing periods of the trees in Japan, it is stated that no harm is done to them by the consumption of their leaves by the larvæ of the "oak-worm."

A Difficulty in Studying Insects.

A principal difficulty presented to the uninitiated in the study of Entomology, appears to us to lie in the comprehension of specific existence and invariability. It is so easy to understand that the young of the animals resemble their parents, but apparently so difficult to comprehend, that this rule is equally valid in Insects and is, in fact, a broad zoölogical principle. The flies on the window pane, which usually belong to two or three distinct species, are generally looked upon as one; the differences in size being regarded as the effect of different stages in individual growth. The existence of the metamorphoses also tends to confuse partial observers, of all others the hardest to understand the real position of Nature's affairs. In an imperfect observation these think they have discovered a truth, and from thenceforth all reasoning and demonstration are apt to be rejected in favor of the erroneous testimony of their vision. Large storehouses filled with grain are to be found in the principal seaboard cities on the Atlantic Coast, and the grain moth and grain weevil are a matter of yearly production, yet the men who have charge of this grain—grain measurers, store-house keepers and the like—still regard the weevil as the same insect with the moth, merely in a different state or form, and both as originating spontaneously; as if, as it were, the grain literally took to itself wings and flew away, much as the Bible tells us is the case with earthly riches.

But if we can only convince ourselves, that the issues of any one fly or moth resemble and are specifically identical with their parent we at once bring order out of what before was a chaos, where butterflies, flies and beetles existed as creations bound by no natural laws, but ready, at the beck of an invisible enchanter, to take unto themselves shapes impossible to be deduced from their present appearance. Wonderful as are the real metamorphoses of insects, the Naturalist can predicate them from his experience and observation, and know when the tiny existence has reached its tether and the fluttering atom, with its last pulsation, obeys the common law and becomes resolved into the elements. Even those Naturalists, as yet few in number, who profess the Derivative Theory of Creation, require their followers first to understand the invariability of species and the condition of specific existence, before requiring them to unlearn their truthful lesson to take up the teachings of a school which must ever appeal from facts to fancies, from actualities to probabilities, and whose theories depend for their construction so greatly on those parts of speech known as the auxilliary verbs. G.

THE WHITE GRUB.

BY BENJ. D. WALSH, M. A.

The "White Grub," as it is popularly called, is a soft, white, six-legged larva, with a light mahogany colored horny head, and when full-grown is nearly as large as a man's little finger. Like the rest of the entomological group to which it belongs, it usually curls its body up in a semicircle, so that its head almost touches its tail, though it has the power of straightening itself out, when laid on a flat surface, and crawling very slowly along upon its belly. It lives several years in the larva state, and finally in the early spring changes into a dark chestnut-colored beetle about an inch long, and with long slender legs, which flies round in warm evenings in May with a buzzing noise and is often attracted into houses by the light. From the month in which this beetle appears, it is popularly known as the "May-bug" or more correctly speaking "May-beetle." Its scientific name is *Lachnosterna quercina*, and a figure of it will be found in Harris's *Injurious Insects* p. 30.

There is another very similar larva, often found very abundantly in dunghills and occasionally under cow-dungs in the fields, which by inexperienced persons is often confounded with the true "White Grub." As this larva is necessarily carted out into fields along with dung, I have known many men to suppose that they had thereby introduced the "White Grub" into their fields, and thus furnished a rod for their own backs. This, however, is an entire mistake. The true "White Grub" feeds exclusively upon living vegetable matter, and generally upon the roots of living and growing plants. The other larva, which is in some localities distinguished as the "muck-worm," feeds exclusively upon dung; and hence the black dung that it has devoured shows through its white, semi-transparent skin all the way from its head to its tail like a large, lead-colored intestine. In the true "White Grub," on the contrary, it is only near the tail that the contents of the body exhibit a lead-colored appearance, because it is only near the tail that the roots upon which it feeds have become digested and converted into a dark-colored excrement. The only damage that the "muck-worm" can do is to consume a portion of the manure, which would otherwise go to fertilize the soil. We shall shortly see that the "White Grub" operates in a most injurious manner upon a great variety of the crops raised by the Agriculturist. Singularly enough, not only do the larvæ of these two distinct species closely resemble one another, but the perfect insects also have a general resemblance and are often confounded together, as they appear at the same time of the year and fly in the same manner in the dusk of the evening. The beetle produced from the "muck-worm" (*Ligyrus relictus*) may, however, be distinguished by the general observer from the "May-bug" by its legs being short and stout instead of long, slender and sprawling; and in numerous scientific details the two differ very widely. In the *Prairie Farmer* for August 9, 1860, (p. 82) I have given an outline figure of each, and also of the common "White Grub."

In gardens, the "White Grub" is particularly destructive to strawberry beds, and is probably one of the chief reasons why this plant will not last more than a few years on the same spot of ground in this country. It is also, as I have noticed for many years, very destructive to beds of head-lettuce, devouring their roots under the surface of the ground so that the plant withers away and dies, in which respect the habits of this insect are nearly the same as those of the common "cut-worm." It is not, however, near so easy of discovery as the "cut-worm," as it usually lies much deeper in the earth; but if not found and killed, it will travel along a whole row of plants, killing them all one after another. In spading up garden ground in the spring, it is a very common thing to meet with this insect either in the larva or in the perfect state; and care should be taken always to destroy all that are thus met with.

In tame grass meadows this larva has been known for time immemorial both in the East and the West as a most destructive pest, devouring the roots of the grass so that large patches can be rolled up like a carpet. It has also been long known in Illinois to be very injurious to young trees in nurseries, often entirely ruining large quantities of them. Mr. Kinney, the nurseryman of Rock Island, Illinois, informs me that last season it destroyed for him, on a moderate computation, a thousand dollars' worth of young trees. Yet, compared with many similar establishments in this State, his nursery is of very limited extent.

Twenty years ago I detected numerous "White Grubs," cutting off the young corn when it was only a few inches high, in an eleven-acre field of prairie land, which I had had broken the preceding year and had recently planted in corn. Along with the "White Grub" there were also many "cut-worms" and "wire-worms" engaged in the same mischievous operation; and so numerous were those three insects, that I was obliged to go over the field several times, unearthing and destroying them, in order to save my crop. But of late years, as will appear from the following extracts, in certain parts of the country, the "White Grub" has increased and multiplied so extensively, that it not only thins out the young corn, when it is only a few inches high, but destroys the full-grown corn over the whole surface of entire fields.

> On Prairie Ronde [in Michigan], which was formerly noted for its great corn crop, the "White Grub" (*Melolontha*) has appeared in such numbers for a few years past, as to nearly destroy many fields of corn, and has sometimes been very injurious to wheat. I visited this locality in August, 1864, and was surprised to find farmers whose corn crops were so nearly destroyed, that they were selling their hogs in a lean state, because they had not the means to fatten them. On examining the few corn-stalks that remained standing, I found the roots generally eaten off to within a few inches of the stalk, and often from three to five large grubs in a hill. Most of the corn was killed early in the season, and the few stalks left were dying a lingering death without producing any grain.
>
> I was told that the insect was first noticed there about nine or ten years previously, and that, about every third

year since, the corn and wheat had been considerably injured. It probably does not grow to sufficient size from the egg to be very destructive till the third year; but whether this is its last year in the larva state seems uncertain.—(From a letter by Sanford Howard, Esq., Secretary Michigan State Board of Agriculture.)

A few years back many meadows [in Missouri] were injured and others ruined [by the White Grub]; and from the number of worms to be found in affected meadows, it was suspected of being the cause of the mischief. By taking hold of the grass, the sod would peel off in great flakes, exposing numbers of worms. But now, in addition to their depredations on meadows, they are destroying whole fields of corn. I have seen fields where they have destroyed the corn in patches over the field for yards and for rods around, leaving the ground bare as a travelled road. They seem to destroy the taproot first, and afterwards prey on the laterals.—(Letter from Huron Burt, of Nine Mile Prairie, Missouri, printed in the *Valley Farmer* November 15, 1865.)

I am not aware of any recorded cases, other than the above, where this insect has been known to attack corn. What, therefore, can be the reason why, within the last few years, it should have increased so greatly in numbers, as to make a violent irruption upon a crop which has been largely grown throughout the United States for time immemorial? Why do we hear from the farmers year after year more and more complaints of the damage done by the "White Grub?" Why do the nurserymen suffer from it much more grievously than they used to do? These questions are of great practical interest; but, as in so many similar cases, for want of the needful experiments they can at present only be answered by guess-work.

I suspect that the above phenomena are to be either wholly or partially attributed to the introduction of improved breeds of hogs in the place of the old, slab-sided, long-nosed prairie-rooters, and to the passage of laws compelling people to keep their hogs under fence instead of allowing them to run at large. "The hog," says Mr. Emery of Chicago, "in his natural state is a long, lean, cadaverous-looking animal, apparently as wild as when the herd 'ran violently down a steep place into the sea.' Their noses are in the ground wherever they can be, and if perchance they find their way into the lawn or pasture, it is soon full of unsightly spots where the turf is overturned. That they obtain anything from the earth of any value to them as food, compared to the injury they do, is not generally believed." (*Agric. Report*, 1863, p. 205.) With all due deference to Mr. Emery's opinion, I cannot believe that a gang of hogs would work hard by the hour together, as I have often seen them do, unless they got something to repay them well for their labor. I used to suppose that they were after the fleshy roots of such plants as the Aster, but I have since seen them so often rooting in places where there was absolutely nothing but clean blue-grass, that I am satisfied that it must be insects which they are in search of, and probably amongst other subterranean larvæ the notorious "White Grub." The point might be definitely and satisfactorily settled by shooting a few specimens, when they were actually engaged in rooting, and examining the contents of their stomachs. But what private individual can be expected to destroy fifty dollars worth of hogs, in order to solve a question which concerns the whole community of farmers as much as his own individual self?

So far is Dr. Fitch from doubting the fact, that it is for the sake of the grubs and worms found under turf that the hog roots it up, that he actually recommends enclosing a gang of hogs by a temporary fence upon such portions of a meadow as are badly infested by the "White Grub." (*N. Y. Rep.* II. § 76, p. 56.) "The propensity of these animals," he observes, "for rooting and tearing up the turf, we are all aware is for the very purpose of coming at and feeding upon the grubs and worms which are lurking therein." I have little doubt that Dr. Fitch is right here; but still it is always dangerous jumping to conclusions without any positive proof; and before basing a remedy upon a fact, the truth of the fact itself ought to be first ascertained by actual experiment.

If we choose to allow, for argument's sake, that hogs, when running at large, destroy the "White Grub," it must be evident at once that any law forbidding hogs to run at large must have a strong tendency towards causing the "White Grub" to increase and multiply. Now within the last few years such laws have very generally been passed in the Western States, and moreover the old-fashioned prairie-rooters have very generally been replaced by improved breeds, which have not the same strong and ungovernable propensity to turn up the soil. Hence, putting this and that together, I am inclined to infer, that the presence of the "White Grub" is often to be attributed to the absence of the Hog. If this theory be correct, we ought, as a general rule, to find the "White Grub" most abundant and most injurious in those districts of country, where no hogs have run at large for a long series of years; and scarcest and least injurious in those, where there are many hogs running at large up to the present day.

But the undue multiplication of Noxious Insects depends upon so many and such complicated causes, that it will be always unsafe to generalize upon a few isolated cases. With subterranean larvæ more especially, we know scarcely anything of their Natural History, owing to their being hidden from our sight in the very bowels of the earth. In the United States there are at least a thousand distinct species of insects, the larvæ of which live under ground and prey upon the larvæ of root-feeding species. But which Cannibal larva attacks which root-feeding larva, nobody knows at present, and nobody is very likely to know for some time to come. All that we can say is, that there are at least a thousand insects, some one or more of which may and very probably does prey upon the "White Grub" beneath the surface of the earth; and that the scarcity or abundance of the "White Grub" in any particular district may and probably often does depend upon the abundance or scarcity of the particular insect that preys on it. The scheme of the Creation is a most complicated and a most wonderful one. A is preyed upon by B, B by C, C by D, and so on to the end of the alphabet, and you cannot increase or diminish the numbers of any member of the great series, without remotely and indirectly affecting the welfare of all the rest.

To apply the above principles to the practical question at issue. If it could be proved that in a thousand different neighborhoods where no hogs had run at large for ten years, the "White Grub" was now very injurious and very abundant, and in a thousand other different neighborhoods where many hogs had run at large for ten years, no complaints were made of the "White Grub," I should say that the truth of my theory was proved. But if a similar thing was shown only of a few neighborhoods, I should infer nothing positive either one way or the other; because the undue multiplication of any Noxious Insect does not depend upon any one cause exclusively, but upon a most complicated variety of different causes, and we can only judge of the effect of any one particular cause by taking the average of a large number of cases.

Besides the damage done by this insect in the grub state, it occasionally, in certain years and in certain localities, gathers in great swarms upon fruit trees, chiefly cherry or plum, in the perfect or winged state, so as to strip them more or less completely of their leaves. Cases of this kind are on record in the Eastern States, but I never heard of any such in the Valley of the Mississippi, although there as elsewhere the Perfect Beetle feeds upon the leaves of trees.

Rock Island, Ill., April 3, 1866.

HOW TO OBTAIN THE NAMES OF INSECTS.

Those of our readers who desire to obtain the scientific names of the insects of their locality, can obtain them by sending duplicate specimens, each species bearing a number corresponding with that of the same species they retain in their collection, to the Curator of the Entomological Society, 518 S. Thirteenth street, Philadelphia, Pa., who will, in return, send the proper names of the insects according to the numbers which the specimens bear. We have received many letters from subscribers in different parts of the country, who, not having access to the necessary Entomological works, are anxious to obtain names for their insects; we have therefore made arrangements with the Curator of the Society to have the insects that may be sent, properly determined. Always send *duplicate* specimens, as we cannot undertake to return them, and in all cases the postage or express charges must be pre-paid.

In sending specimens through the Post-office, they should be enclosed in a paste-board box, (a gun-cap box, for instance) in order that they may not be crushed in the mail-bags; but in sending insects by express, the utmost care is necessary to insure their safe carriage, especially with pinned specimens. These should be firmly secured in a stout box, which box should be placed in a larger and stouter one, with the space between the two boxes filled in with cotton-wool, or some other soft and buoyant material; in this way, if properly done, the jarring occasioned by transportation will have little or no effect upon the insects in the inside box.

The Cabinet of the Entomological Society contains over 15,000 species of insects, and is the largest collection of the kind in this country, which, with its splendid Library of Entomological works, give rare facilities for ascertaining the names of insects of all kinds. And yet this collection is far from being complete; there are thousands of insects in our country, especially in the Western and Southern States, that are not represented in the collection, and many as yet unknown to science. Will not those of our readers who have the opportunity to collect insects, send the Society a collection made in their locality, in order that they may be made known to science? The Society is very much in want of insects from any of the Southern and Western States. We have readers in Missouri, Arkansas, Texas, Utah, Colorado, Dakota, Oregon and California, and if they would collect and send the Society a representation of their insect fauna, they would prove most acceptable. In such cases, the expenses of transportation will, of course, be paid by the Society.

Beetles, Wasps, Ichneumon-flies, Bugs and Leaf-hoppers, should be preserved in bottles containing good alcohol; but Butterflies, Moths, hairy Bees, two-winged Flies and Dragon-flies, should be carefully packed in between layers of soft paper or cotton, sprinkling in the box a few crubs of camphor to preserve them from mites. Butterflies and moths should be handled very carefully, and the wings should not be touched with the fingers, as the scales thereon are easily rubbed off, and the specimen spoiled.

When the alcohol becomes too much discolored by the insects, it should be poured off and fresh spirits added.

Care should be taken in packing the specimens so as to carry safely in transportation. The name of the locality in which the insects were collected should be pasted on the bottle or box containing them, and any information of their habits will be both useful and interesting.

Address all packages for the Society as follows: Entomological Society, *No.* 518 *S. Thirteenth Street*, Philadelphia, Pa.

TRICHINA SPIRALIS.

BY BENJ. D. WALSH, M. A.

As many persons are now afflicted by a very causeless panic as to the danger of eating Trichinous Pork, and as, on the other hand, others deny the existence of any such danger under any circumstances, I propose to state briefly such facts bearing upon this subject as have been abundantly proved by the best scientific evidence.

1st. *Trichina spiralis* is a minute worm, scarcely $\frac{1}{16}$ inch long, sometimes found in enormous numbers in the flesh of the hog, and generally enveloped in a hard shell. Out of 1394 hogs microscopically examined at Chicago by a competent scientific committee, as many as twenty-eight, or about one in forty-eight, were found to be thus affected in a greater or less degree. In Germany, where the disease known as Trichiniasis almost exclusively prevails, only one hog in about ten thousand are so affected.

2nd. When Trichinous meat is eaten raw, the hard shell of the Trichina is dissolved by the juices of the stomach, the worm becomes free, passes into the intestines, generates there male and female together in the usual manner, and the female subsequently produces a very large number of young ones. A few of these young ones are expelled with the *fæces*, but the great bulk of them eat their way through the intestines into the muscles, and after producing there considerable pain, greater or less according to their number, finally become enveloped in the same hard shell as in the hog, in which state they may remain alive for dozens of years without causing any further inconvenience. If the number of *Trichinæ* is very large, death quickly ensues; if moderate, only pains and prostration; if small, no very material inconvenience. Under no circumstances does the worm ever breed in the muscles.

3rd. Hogs that eat the fæces expelled from a human being or any other animal suffering from Trichiniasis in its early stages, become infected by the disease by the young worms contained therein, or they may become infected by eating the flesh of any animal suffering from Trichiniasis in its later stages. Cats suffer from this disease, and probably dogs also.

4th. It is a ludicrous absurdity to contend, as does the Editor of the *Chicago Republican*, that Trichinæ exist in the human body irrespective of any consumption of raw Trichinous pork. Scientifically the entire history of this animal is nearly as well known as that of the Cow or the Horse. He might as well contend that lice could breed in a boy's head without the intervention of some primordial mother-louse to start the breed.

5th. A heat of 150° Fahrenheit (the boiling point being 212°) kills the Trichina effectually. Hence there is no danger whatever in eating Trichinous pork that has been thoroughly cooked; but all persons should be particularly careful not to eat smoked sausages under the idea that they are cooked, because it is only a particular kind of smoking that destroys the Trichina.

6th. In Germany it is a very common practice to eat raw sausage, raw ham and raw pork. In America scarcely anybody does so. Hence we see at once why Trichiniasis in the human subject is very common in Germany and almost unknown in America, although for one hog that is infected in Germany two hundred are infected in America.

As a comment upon the doctrine of those who, in the teeth of the strongest scientific evidence, deny that Trichiniasis is caused by eating Trichinous pork in a raw state, I subjoin the following Report of a Meeting at Berlin in Germany, copied from the *London Lancet*. I shall only add that I practice what I preach myself, and eat well cooked ham almost every day without fear and with perfect impunity, and recommend others to do the same. Will the Editor of the *Chicago Republican* follow out his principles in the same practical manner, and eat raw ham or raw sausage known to contain the Trichina?

"Professor Virchow addressed the meeting, and urged the necessity of instituting a microscopical examination of all pork. At the conclusion of his speech, he handed to the president a piece of smoked sausage and a piece of meat from a pig, which had been recognized as trichinous. Thereupon a veterinary practitioner, named Urban, rose and combated all that science has acquired during the last five years as an unfounded illusion. 'Trichinæ,' he said, 'are the most harmless animals in the world. It is only doctors without practice who make a noise about them, in order to create some occupation for themselves,' &c. (Great interruption.) The president is obliged to stop the veterinarian. Drs. Virchow and Mason demand an apology from M. Urban. Dr. Mason challenges Urban to eat some of the sausage on the president's table. (Great applause.) Urban wishes to explain. The meeting calls upon him to eat. 'He had not spoken of Berlin doctors ('Eat, eat!') but of those at Hedersleben. ('Eat!') He would first see whether the sausage contained trichinæ.' (Great laughter and continued shouts of 'Eat, eat, eat!') Whereupon M. Urban suddenly seizes the sausage on the president's table, bites off a piece, eats it, and leaves the hall forthwith, amid the applause and laughter of the assembly."

A German newspaper reports that five days later the veterinarian Urban was confined to his bed, and his arms and legs were paralyzed. His illness was caused by trichinæ contained in the sausage he had been badgered to swallow; and, as might be expected, the result was fatal.

Rock Island, Ill., April 16, 1866.

RECEIVED.

Besides those publications acknowledged in our last number, we have received the following:—

A General View of the Agriculture and Industry of the County of Kennebec, Me., with Notes upon its History and Natural History, by Samuel L. Boardman, Junior Editor of the Maine Farmer. (Part first—Historical and Descriptive.) Augusta, Maine, 1865. Pamphlet, 8vo.

This volume is very interesting, being devoted to the History and Natural History of the County, and is evidently a work of much labor and research. The second part, soon to be issued, will treat of the Agriculture and Industry of the County, and will contain statistical and other matter of much value, and possessing an interest, not merely local, but of a general character. Persons desirous of procuring the work, should address Mr. Boardman, Box 655, Augusta, Maine.

Sexual Physiology—A scientific and popular exposition of the fundamental problems in Sociology, by R. T. Trall, M. D. 1 vol., 8vo. Illustrated with 80 cuts, and neatly bound. Published by Miller, Wood & Co., No. 15 Laight Street, New York.

The great interest now being felt in all subjects relating to Human Development will make this book of interest to every one. Besides the information obtained by its perusal, the practical bearing of the various subjects treated in improving and giving a higher direction and value to human life, cannot be over-estimated. The price of the work is $2, and will be sent by mail to any address for that price.

The American Farmer—A monthly journal of Agriculture and Horticulture, published by John Turner, Rochester, N. Y., at $1 a year. This is certainly a very cheap paper, being well gotten up, in an octavo form of 32 pages, and ably conducted.

Colman's Rural World—A most excellent semi-monthly journal, devoted to the promotion of the Agricultural, Horticultural and Stock interests of the Valley of the Mississippi. Published at St. Louis, Mo., by Norman J. Colman, at $2 a year.

Southern Cultivator—A practical and scientific newspaper for the plantation, the garden and the family circle. Published monthly at Athens, Ga., by Wm. N. White, at $3 a year. This is an interesting and attractive journal, containing 36 pages of valuable information.

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—Associate Editor.

L. S. Pennington, Illinois.—There are two very distinct kinds of bark-lice or scale-insects that commonly infest the apple-tree in Illinois; one of these is dirty-white, of an elongate slightly curvilinear shape, rather hunched, and about thrice as long as wide; the other is milk-white, oval, very flat, and about half as long again as wide. The first is the common imported Bark-louse, which has been gradually working westward through Illinois for the last ten or twelve years, and within the last year or two has reached Rock Island County, on the Mississippi River, and, as it seems from your account, Whiteside Co. also. The second is an indigenous insect, and I have noticed it for many years on crabs and willows, and in comparatively small numbers on apple-trees. This year, on certain branches of one of my apple-trees, I find it so thick, that it completely covers the bark, and would, no doubt, if not attended to, kill the tree in a year or two. Occasionally it happens that the two species occur promiscuously on the same tree; but it is far more common for each to be met with by itself. The imported insect, if allowed to run its natural course, is certain death to any tree that it attacks, when it is first introduced into a new neighborhood; but after a few years it is attacked by cannibal insects, chiefly Lady-birds, (*Coccinella*,) which thin it out and prevent it from increasing so exorbitantly as before. Until this year, I had not supposed that the indigenous species would ever multiply to any very serious extent on apple-trees, though I had seen it in one instance sufficiently numerous to kill willow-trees; and Mr. Kinney, the Rock Island nurseryman, who has noticed it for many years on one or two of his apple-trees, was of the same opinion.

You enquire as to the safety of petroleum as a remedy. Last spring, on a few branches of two different apple-trees, I found the imported Bark-louse pretty thick. So I trimmed the twigs off pretty closely on these particular branches and painted the trimmed limbs with common Kerosene, using for the purpose what painters call a "sash-brush." On a close examination this spring, I find that the result was quite satisfactory, no new bark-lice being to be found, though the old dead scales still adhere to the bark, and the painted limbs being not killed. It is certainly possible that if a whole tree were treated in this manner, the consequences might be fatal; and here, as in so many other cases, we need carefully conducted experiments to guide us. I notice, however, that Mr. Cavanach, the Brooklyn gardener, says, that he commonly uses Kerosene to kill bark-lice without any ill effects resulting therefrom. (*N. Y. Tribune*, March 16, 1866.)

Samuel Canby, Del.—There are several distinct species of the genus *Tinea*, which infest woollen clothes, carpets, furs, feathers, &c.; but as the habits of all of them are nearly the same, it is of no practical importance to dwell on this point. As a general rule, the species that infest furs are distinct from those that infest carpets, and so forth; but almost all of them in the larva state live in little elongate cases, which they construct from the infested material; and all of them finally change into small, four-winged moths or "millers" of a dull grayish color, with no very conspicuous markings. It is of course these moths that lay the eggs from which proceed the larvæ that do all the mischief. The moth itself is incapable of eating into anything, having no jaws to eat with and nothing but a proboscis or tongue adapted for sucking liquid food. These insects pass the winter in their cases, and come out into the moth or winged state about the time that the first warm weather commences. They are all of them imported insects, and are just as common in Europe as in America.

When furs are bagged up for the summer to preserve them from the moth's laying its eggs on them, care should be taken that there are no larvæ already in them. Otherwise you might have a large colony raised in perfect security, the paper or linen bag preventing you from watching their operations. Tobacco and camphor, as all good housewives know, are offensive to the moth; and either she will not deposit her eggs upon such articles as are constantly moved about and exposed to the open sunlight, or if by chance she does so, the young larvæ are soon crippled and destroyed by the rough usage they meet with. It is remarkable that the carpet-moth generally lays her eggs near the wall, because the carpet is there seldom disturbed by walking on it. Hence, if tobacco is used to keep carpets from being attacked by the moth, it is generally sufficient to scatter it next the wall. Of course, the oftener a carpet is taken up and beaten, the less chance is there for a colony of the larvæ of the carpet-moth to establish itself therein.

Silas F. Judson, Michigan.—You say you have a "small worm (it may be the cut-worm) that eats up your onions and most of your garden sauce, even potatoes and peas, but does not touch the corn," and you enquire what is the best way "to get rid of them." Are you certain it is the same insect that attacks all these plants? Likely enough there may be half a dozen different kinds attacking your garden. As you give no description of the "worm," except that it is "small," nor of the way in which it operates, whether under ground or above ground, whether by day or by night, whether solitary or several in company, &c. &c., it is utterly impossible even to guess what insect you refer to. You might as well write to a Detective Officer at Detroit and say "There is a rather short man perpetually stealing bacon, flour and meal out of my smoke-house. Please tell me what his name is and where he lives." In the whole United States there are about thirty thousand distinct kinds of insects? How then is it possible for any one to tell which particular one you mean, when all you say about it is that it is "small?" If you will send me specimens by mail in a little pasteboard box, (a gun-cap box answers a very good purpose,) I can probably tell you what they are, and perhaps how to fight them. But at present I can tell you nothing, because I know nothing.

P. C. Truman, Iowa.—The borers you sent arrived in first-rate order, and belong both of them to the same species, one being in the larva state and the other in the perfect or winged state. They are the *Saperda calcarata* of Say, and have long been known to infest different species of Poplar. Botanically the Cottonwood, out of which you split them, is a true Poplar, though in common parlance it is not so considered. I was very glad to get them, as the insect does not occur in this neighborhood, so far as I am aware, and was new to my collection. As you enquire respecting some elementary work on Entomology, I should recommend you to Harris's *Injurious Insects*, edition of 1862, Boston. It contains many plates and figures, and you can probably get it through any bookseller. The price is, I believe, $5 for the edition with colored plates. That with plain plates is cheaper, but how much cheaper I do not know.

Lucy D. Hunt, Mass.—The worm that you find so troublesome in flour and rye meal in July and August, and which you describe as about an inch long, must be the common "meal-worm," an imported insect, very common on both sides the Atlantic, though you describe it as "white and flat," whereas it is in reality of a yellowish-white color, and no more flat than your knitting-needle. "The long black bug, similar to the snapping-bug," which you find "in and near the flour and meal," must be the same insect in its perfect or winged state. Scientifically it is called *Tenebrio molitor*, and it is a true Beetle belonging to the Order *Coleoptera*, and differing from the Snapping-beetles (*Elater* family) in having only *four*, instead of *five* joints to its hind feet (tarsi,) and in a variety of other respects. You will find a figure both of the larva and of the Perfect Beetle in Harris's *Injurious Insects*, pp. 10—11. The Bacon-bug (*Dermestes lardarius*), which you well describe as "a small, black bug (beetle) with a dirty white stripe across the middle of his back," and which, as some of your neighbors thought, had produced your flour-worms, has an entirely different larva, furnished with long hairs, and could not live in flour.

ACKNOWLEDGMENTS.

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Edward Burgess, Massachusetts	$5.00
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LaMar K. Hayhurst, M. D., Missouri	1.00

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☞ To our Readers.—We would be much obliged to any of our readers patronizing those who advertise in this paper, to mention in the letter sending orders, or for circulars, &c., that they had seen the advertisements in the Practical Entomologist; this will not only prove a satisfaction to the advertisers, but will secure us an advertising patronage, which will go far towards insuring the prompt issue of the paper.

List of Advertisers in present Number.

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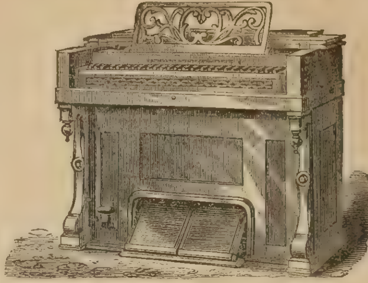

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Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

VOL. I. MAY 28, 1866. No. 8.

The Practical Entomologist.

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BENJ. D. WALSH, Rock Island, Illinois, ASSOCIATE EDITOR.

PHILADELPHIA, MAY 28, 1866.

☞ We have been repeatedly urged by numerous subscribers to give a series of lessons on Entomology, for the instruction and accommodation of those who have not the means and opportunity of procuring the necessary works on the subject. By special request, Dr. A. S. Packard, Jr., of Maine—a thorough student of Entomology—has kindly undertaken the task, and gives his first lesson in this number, illustrated with two outline drawings, which will assist the reader in the study of this beautiful and fascinating science. The phraseology of the articles will doubtless appear too scientific for most of our readers, but it should be remembered that there is no art, profession or trade, which can be taught or learned without the use of technical words or phrases belonging to each, and which, to the inexperienced and untaught, are as unintelligible as the terms of science.

It is hoped that these lessons will receive the careful attention they most certainly deserve, and when the series is finished, the reader will, no doubt, have an elaborate insight into the principles of entomological science.

The advantages of studying Entomology.

Köllar, speaking on the advantages of studying Entomology to the Agriculturist and Forester, and on the method of doing so, says in the introduction to his excellent *Treatise* :—

The intimate connection in which insects stand to man, to domestic animals, and to the different kinds of vegetable productions, makes them well worthy the consideration of every one, and particularly of the agriculturist and the forester. Although insects are small and inconsiderable, the exceedingly great number of species, and the still greater number of individuals in many of them, fully compensate for their want of corporeal magnitude. The amount of the species of plants, and all the classes of other animals taken together, cannot (according to the latest estimates) equal in amount the species of insects, as we reckon about 300,000 species. If we consider the fecundity of many kinds of insects, which sometimes produce an offspring of several hundreds, or even thousands, (the females of the termites, or white ant, producing an offspring of 40,000,) and also that some kinds produce several generations in one year, it appears evident that the number of insects can hardly be estimated. As a proof of this, which perhaps to many may appear too bold an assertion, we need only to mention the enormous swarms of locusts [grasshoppers], which are sometimes so numerous, and in such masses, that they darken the sun, and when they alight, they frequently cover several square miles of land; also the *Rhagio columbaschensis* Fabr., a minute dipterous insect, but a fearful plague in many parts of the bannat of Temeswar [in Southern Hungary, Europe], and which, when congregated in the air, resemble dark clouds, although each individual is not more than two lines [one-sixth of an inch] long. Who could even reckon the myriads of gnats or midges, which in many years, like pillars of smoke, ascend in the air? Or who could succeed in ascertaining the number of inhabitants in an ant-hill? All these myriads derive their nourishment either from plants or animals, in their living state, or from their remains when dead; and there are even some to which man himself must pay tribute with his blood.

" From such considerations are we not" (says Schrank, the worthy Bavarian naturalist,) "alarmed for our forests, gardens, and groves? Do not these innumerable millions of insects which incessantly labour at their destruction, confuse our understanding when we begin to reckon them, and terrify our imagination which magnifies them? And can I be believed if I assert, that I discover benificence in such unspeakable destruction, beauty in these devastations, wisdom in this disorder, and life in this manifold death? Nevertheless it is so. Whatever many may say of nature growing old, the naturalist finds her always young and beautiful, always estimable, just as she came from the hand of her Creator, and as she indeed every moment issues afresh from the hand of the Almighty Being. In His hand the youth of nature is continually renewed; and under His all-ruling providence, all the millions of apparently destructive beings only labour in preserving her existence and embellishment.

"Let us here contemplate the whole economy of nature at a general glance, in respect to forests only; and let us view her as she is, without the aid of man, who often disturbs her general arrangement.

"Insects that feed on wood are not injurious to ligneous plants, except from their disproportionate numbers; and these numbers, when left to bountiful nature herself, are never disproportionate: two assertions which, however paradoxical they may seem at first sight, are yet admitted by the naturalist, who has proofs of them daily before his eyes, as principles, but which I must here demonstrate, because many persons who are engaged in studying the works of nature, either as professional men or as amateurs, are not naturalists.

"In a work on the Fruitfulness of Plants [also written by Schrank] it is stated that an elm twelve years old in one single year produces 164,500 seeds; which, in the course of another twelve years, (if no accident happened) would become as large trees as their parent: and from this calculation it appears that a succession of much more than 26,960 millions of trees might be obtained from one.

"This calculation is made from the fruit only, and not from the blossom of any tree, and is, therefore, applicable to all other trees. A single species of tree, such as we have them in one of our provinces the most scantily clothed with trees, would, during the life of man, cover a large extent of land with a thick forest, and after a few centuries it would appear as if the whole world had been made for it only—as if it alone would cover the whole extent of dry land.

"The great multiplicity of organized beings which makes the world as it is at present so beautiful, would then have disappeared; symmetry, which gives a charm to this multiplicity, and which delights the contemplator of nature in exalted enthusiasm, would have vanished; soon would all animal life in the habitable world be destroyed; a great number of birds which live only on insects which eat wood, we have already annihilated, by our presupposition that these insects do not exist; the thick impenetrable forest, which the kind of tree mentioned would cover, would soon supplant every blade of grass, kill every insect intended to live upon it, every bird to which these insects were intended as food, destroy all animals living upon grass that could not reach the tops of the high forest trees, and finally kill every beast of prey, which could not at last even find a carcase to satisfy its ravenous hunger.

"This is but too faint a picture of our earth, which, without the insects that live on wood, would be but too true. A wise hand has scattered them everywhere, and given to each kind its particular instinct, its peculiar economy, and great fecundity. With them, order and life are restored to universal nature. On their side, pursued by powerful, or weak, but not less numerous enemies, they unceasingly follow the given commands of Providence.

"The proportion which exists between their increase and the occasion for it, and their enemies, secures nature from the devastations which they would occasion, and restores all to the most admirable equality.

"A forest of firs more than a hundred years old, has already nearly terminated its appointed existence. A host of caterpillars first takes possession of the branches, and consumes the foliage. A superfluity of sap, (the circulation of which is rendered languid by the failing strength of the tree), an unnatural increase of the nourishing juices between the bark and the wood, and the separation of these parts, are the consequences.

"Another host of insects now appears; they bore through the rind into the inner bark, which they eat, and pierce through; or into the wood, which they pierce and destroy. The diseased trees are now nearly dead; the numerous destructive insects increase with the sickness which attracted them there; each tree dies of a thousand wounds, which it receives externally, and from the enervation which follows in consequence. The dissolution is accomplished by a third host of, for the most part, smaller insects, but still more numerous; and these are continually employed in reducing the decayed trunks to dust as soon as possible, while at the same time a thicker forest of young trees, and generally of a different kind, spring out of the earth, which had afforded nourishment to the dead tree. The first host certainly occasioned the deathly sickness of the forest; the second accelerated its death; and the third accomplished its total destruction. It need not be lamented. These trees would have died a few years later, without any utility resulting from their death. Their leafless stems would probably have remained there for half a century awaiting their destruction, of no use where they stood, and serving no purpose but as a fearful trophy of death in the field of life. They must die, because they are organic matter. But we only destroy a worn-out vessel, that a better may take its place, but are not able to make anything better out of it. It is not so with nature. Millions of sensitive beings find a use in the remains of these dying trees, and under every step of near and approaching death, thousands spring forth endowed with vitality.

"Each host of these insects are again exposed to destroyers, which put a check to their too great extension. Other insects, and a great number of birds, clear away the caterpillars while they are feeding on the leaves, and when they have undergone their change, and are lying in the earth, the wild boar comes and stirs them out from their place of rest with his tusks, and devours them with the greatest eagerness. Those insects which conceal themselves in the inner bark or wood do not share a better fate. The woodpecker knows where to find them, and draws them out of the deepest holes. When they appear on the bark in the perfect state, they have the bitterest enemies in the fly-catcher, the tree-creeper, and all kinds of magpies. Whole hosts of these birds are found where these insects abound in multitudes; but they leave the place and disperse themselves as soon as the superfluity of nourishment is exhausted. In this state all nature is on a perfect equality; but man comes, and destroys the order—he annihilates the harmony of nature, and is astonished at the discordance. First, he sacrifices the wild boar to gratify his palate; takes possession of the wood, and, according to the usual fallacy of taking the consequences for the cause, considers the woodpecker his enemy, and finally, under various pretences, wages war with all the birds of the forest. Insects appear to him too contemptible for his pursuit, too small, too numerous, and too well concealed, to reward him directly for the trouble of endeavouring to extirpate them. They may, therefore, go on with their occupations undisturbed, and if they carry them too far, he then complains of Providence.

"After having wrested the lordship of the woods from the animals, we should pursue with wisdom the economy which heretofore the animals, from a blind impulse of nature, had practised. We should anticipate nature in her operations, and cut down trees that approach weak old age, or those that are checked in their growth by a stronger tree standing near them, or those that have been killed by lightning; and the teeth of the boar which prepared the earth for the seeds, should be replaced by the pickaxe, and our tame pigs ought to be employed in digging up the earth-grubs, which the boar was accustomed to do. We only are to blame if our finest forests are destroyed," &c. Such are the expressions of a practical naturalist on insects which are injurious to forests A similar picture may be formed of those which attack fruit-trees, field fruits of all kinds, and even our domestic animals.

The result of such contemplations will be, that we can only protect ourselves from the injurious influence of insects by an ample knowledge of the reciprocal relation in which one stands to another, and in order to obtain this, it is essentially necessary to acquire a knowledge of those kinds which are directly or indirectly injurious to man, their different stages of life, their nourishment, propagation, duration, and finally their natural enemies.

Popular remedies for Noxious Insects.

BY BENJ. D. WALSH, M. A.

We can scarcely take up an Agricultural Journal, without finding one or more prescriptions against the depredations of Noxious Insects, from the pen of some correspondent. If only a tenth part of these are what they generally profess to be—undoubted and reliable specifics against the particular Insect that they are intended to combat—it is strange that Agriculturists should be complaining more and more every day of the losses that they sustain from Noxious Insects. The remedies are in print, vouched for as infallible by A. B. or X. Y. Z. Why don't they apply them?

The real truth, however, is that many of these so-called remedies are demonstrably worthless—many are founded upon a very insufficient number of observations, and may or may not be more or less partially successful—and only a few of them are of any real value. Human testimony, I am sorry to say, is, as a general rule, to be received with very great caution. It is not that these writers lie wilfully and deliberately, but that they jump to conclusions without fully investigating the subject, and having once formed an opinion in their own minds, support it enthusiastically through thick and thin. Just in the same way, if we believed all the testimony that we see printed in every newspaper that we take up, we should come to the conclusion that for every disease of the human body there was an infallible remedy. Yet the physicians are as busy as they used to be—the sick obstinately persist in dying, in spite of the Golden Drops or the Specific Elixir—and the Undertaker and the Probate Court find their hands as full as ever.

More than a century ago the practice of Inoculation was introduced into Norway in Europe in order to check the Small Pox, and about the same time, from some unknown cause, the fish suddenly disappeared along the entire coast of Norway. All at once a great outcry was raised against Inoculation. It was a ruinous practice, said the Norwegians; it was killing off the fish, which were their chief means of support. Better that a few men should die of Small Pox, than that they should all die of starvation. The reader smiles, perhaps. But these simple people only made the same mistake that is so often made in more modern times—confounding the *post quod* with the *propter quod*, the After with the Because. Again, some centuries ago, the Goodwin Sands on the South-eastern Coast of England had enlarged so much as to be very destructive to shipping, and government sent a commission to the spot to enquire into the cause and the remedy for the evil. Several rustics were examined without arriving at any definite conclusion, till at last a grey-headed old man gave it as his decided opinion, that if they wished to get rid of the Goodwin Sands they must pull down Tenterden Church Steeple. "When that steeple," he argued, "was first commenced, the sands began to accumulate; as it progressed, they got worse and worse; and now that it is finished, they are a terror to all the sailors." We laugh at such reasoning; for here again we see that the After is confounded with the Because. But many an American farmer often argues just as illogically. A certain insect is afflicting one of his crops. Forthwith he scatters lime, or ashes, or road-dust over it. The insect in the course of a week or so disappears, probably because the natural time had arrived for it to go under ground to pass into the pupa state. And then, *hey presto!* we have lime, or ashes, or road-dust recommended in print as an infallible remedy against the attacks of this particular insect.

Another most fertile source of error is the founding general rules upon a very insufficient number of experiments, just as the Quack Doctor, having given a certain dose of Calomel on the same day to a shoemaker and to a tailor, and having found that the shoemaker was badly salivated and that the tailor's gums were not at all affected, jumped to the conclusion that mercury always salivated shoemakers but had no influence whatever upon the constitutions of tailors. Take, for example, the well known Fire Blight on Pear Trees, which attacks particular trees in particular orchards, apparently in the most capricious manner. Some years ago a letter was published from a correspondent of the *Rural New Yorker*, strongly recommending a remedy which he had found effectual on his own trees. In such a case as this, it ought to have been shown that out of a hundred trees, to which the remedy had been applied, none or next to none had been affected by Fire Blight, and that out of a hundred other trees in the same orchard, which had been left untouched, a considerable percentage had been blighted. No such facts, however, were shown in the letter. All that appeared was, that a few trees to which the remedy was applied were not blighted; and even of these, one, if my memory serves me, was said to have been partially blighted. But the remedy itself was so absurd, that it is difficult to see how any sane man could be deluded into trying it. We were to bore an inch augur hole into the trunk of the tree, fill it with ten-penny nails and sulphur, and then plug it up; the theory being, as the learned writer assured us, that the iron of the nails combined with the sulphur and formed Sulphate of Iron, and that this Sulphate of Iron was received into the circulation of the tree and cured the Blight. Unfortunately, however, for the theorist, every chemist knows that Sulphur and Iron will not, when mixed together, produce Sulphate of Iron, any more than Sulphur and Lime, when mixed together, will produce Sulphate of Lime or common Gypsum. Besides, if Sulphate of Iron is a real remedy for Fire Blight, why not purchase it ready-made at the Druggists, and apply it in the form of a poultice or cataplasm to the external surface of the tree, so as to do away with the necessity for that objectionable one-inch augur hole? Talk of borers indeed. Why a single one of these gigantic iron-tailed borers would ruin a small-sized pear-tree, and the remedy would be worse than the disease.

As regards the fallibility of human testimony, I may say that I have more than once tested by actual experiment the assertions of men, whom I considered perfectly trustworthy, and who I know would not intentionally deceive, and found those assertions to be utterly unsupported by facts. For example, I was once told by a fruit-grower, that he had killed all the plant-lice on his trees by making a dense smoke round them with burning tar on a still evening. I received particular directions how to go to work. I followed those directions in the minutest particulars. And the result was that the plant-lice on a particular bough, which had been enveloped in the densest smoke of all and for the longest time of all, were alive and kicking the next day. Do I therefore believe that my friend, the fruit-grower, lied? Not at all. But plant-lice often suddenly disappear in a few days or a week from the action of the numerous parasitic and cannibal insects that attack them. His plant-lice were probably about to disappear in this manner, at the time that he smoked them, and mine were not. And hence we can easily explain why the two experiments resulted so very differently.

By way of practical comment upon the foregoing remarks, I subjoin several prescriptions against Noxious Insects, which have been taken at random from various recent publications, with a few observations upon each:

> TO CURE WORMY TREES.—The following recipe is published in the New York *Evening Post:*
>
> With a large gimlet or augur bore into the body of the tree, just below where the limbs start, in three places, a groove inclining downwards. With a small funnel pour a shilling's worth of quicksilver into each groove. Peg it up closely and watch the result. Had it been done when the sap first started on its upward circuit it would have been more efficacious—yet, even now, it will greatly abate the nuisance.
>
> The plan was first tried for a wormy apple tree by Samuel Jones, Esq., of Canaan, Columbia Co., N. Y., and with entire success. It is believed, that, far from damaging the trees, it will even add to the beauty of the foliage. In the case of the fruit-tree above mentioned the cure was surprising, not only the fruit becoming perfect and beautiful, but the very leaf seemed to grow larger and far more dark and glossy.

What is a "wormy tree?" Does the writer mean a tree afflicted by borers? Or a tree afflicted by the common "caterpillar," or by some other of the numerous "worms" or lepidopterous larvæ that infest the foliage of the apple? Or a tree the fruit of which is infested by the "apple-worm" which is the larva of the Codling-moth? Before one takes Patent Medicine, one usually likes to know what disease it is intended to cure. As to any effect that crude quicksilver would or could have upon the constitution of a tree, we know that it may be introduced into the human bowels in very large doses without affecting the system; while comparatively very minute doses of such chemical preparations of mercury as Calomel or Corrosive Sublimate produce disastrous results. Hence it is reasonable to infer that crude mercury, when introduced into the trunk of a tree, would be perfectly inert, just as a leaden bullet fired into the trunk of a tree produces nothing but mechanical injury, while the same weight of white lead would probably be highly destructive to vegetable life. On the other hand no reasonable man can doubt, that it must injure a tree more or less to bore augur holes into it, especially when they slope downwards, so as to become a receptacle for rain water.

Remedy for the Currant Worm.—H. Stanton, Jr., of Syracuse, N. Y., under date of May 24th, sends the *Rural New Yorker* the following:—"We have recently made an important discovery here, which we wish to make public for the benefit of everybody in general, and their currant bushes in particular. The ravages of the terrible *currant worm* can be completely stopped, and the enemy destroyed by the simple application of *road dust*. We tried it last year with perfect success, and the same this year so far. Gather the dust when it is dry and fine, and keep it for future use. As soon and as often as the worm makes an attack sprinkle it on and throw it up under the leaves so that it will adhere to both sides. The best time is when the dew is on in the morning. Remember, *road dust* from the street or highway. Try it."

I believe that there is only one noxious insect, that can be successfully combated by lime or ashes or road-dust or any such matter, viz: the Slug-worm of the Pear. The reason is that this larva is covered by a slimy secretion, to which the lime or ashes adheres indissolubly and finally destroys it. All other insects, that commonly infest the Field, the Orchard or the Garden, have the faculty of cleansing themselves from any such extraneous matter, and are far too wise to take it into their mouths along with the food on which they subsist. Watch, for example, a common house-fly after it has daubed itself with molasses or any such substance, and you will see it cleanse one leg with another, as deftly as any Christian could do, and wipe its head and its wings with its legs. In all probability the writer of the above made his experiment shortly before the "currant-worm" was about to go under ground to assume the pupa state, and was thus deceived into supposing that his enemy was "destroyed."

Scotch Snuff put in the holes where crickets come out will destroy them.

This is probably extracted from some English publication. In England House-crickets are very common and frequent the backs and jambs of fire-places, ovens, &c.; but in this country they are rare, and, so far as I know, occur only in Southern Illinois, and according to Mr. Uhler, in Maryland. Harris, evidently referring only to the New England States with which he was best acquainted, says that they are unknown in the United States. The common white tree-cricket (*Œcanthus niveus*) sometimes indeed flies into our houses by accident in the Northern States, and annoys us by night by its chirruping; but the ordinary domicile of that insect is on trees and weeds.

To Prevent Weevil in Wheat.—F. J. Robinson, of Lexington, Georgia, writing June 10th to the *Southern Cultivator*, says:

"I send you the following 'Recipe for the Prevention of Weevil in Wheat,' which was given to me by my friend and neighbor, Major C. G. Hargroves, of this county, who, after many years experience, informs me that he has found his wheat to keep to his entire satisfaction: and has thus been enabled to secure, at all times, good flour for his own use, in cases where his succeeding crop was poor, by holding over *old* wheat. You will perceive that the remedy is a very simple one, and the expense next to nothing. Here is the recipe:

After thoroughly sunning your wheat—and sunning also your boxes or hogsheads—and, previous to taking up the wheat, prepare a small fire of cobs or trash, and when it is ablaze, put on it a small quantity of *sulphur*, and fumigate each box or tub well. Then, while the wheat is hot, and the receptacles for it also hot, put your wheat away, and rest satisfied that when you draw upon your bank of breadstuff, you will find your draft honored with 'wheat as is wheat.' Insects are not partial, you well know, to sulphur and its fumes, and hence the success of the physic."

I doubt very much whether the fumes of the sulphur would not entirely evaporate in a short time. Ladies straw bonnets are bleached with sulphur, and yet they have no perceptible sulphureous smell. The burning sulphur would likely enough, if applied for a sufficiently long time, destroy any weevils that were lurking in the crevices of the boxes or hogsheads, but it would not prevent, in my opinion, weevils bred in other localities from infecting the stored wheat.

Weevil in Barns.—I have been troubled with weevil, more or less, for fifteen years, in my grain bins, and have tried every remedy I could hear of—lime, whitewash, elderberries, &c.—but all to no purpose; so I determined to try something else. In July, 1864, my barn being empty of grain, &c., but occupied by millions of weevils, I took a bucket full of salt and sowed it in the barn as a farmer would sow grain, broadcast, about the granaries, mows, and every nook and corner which had had grain in. Ever since threshing time last year I have had grain in the barn, and not one weevil to be seen.—*Corres. Ohio Farmer.*

I am very skeptical as to the salt-cure, as well as the sulphur-cure. In both cases, perhaps, the After has been confounded with the Because.

Elder Leaves and Insects.—The leaves of the elder if strewn among corn or other grain when it is put into the bin, will effectually preserve it from the ravages of the weevil.—The juice will also kill bed-bugs and maggots. —*Exchange.*

Here we have another prescription—elder leaves —to head off the Weevil. The preceding writer says that he tried elderberries to no purpose. I should judge that the berries would, if anything, be more effectual than the leaves; but I much doubt if either would have any perceptible effect. As to the assertion that "insects never touch elder bushes," that is certainly incorrect. The flowers are haunted by a variety of flies and bees, and a large and well-known Boring Beetle (*Desmocerus palliatus*) inhabits the stems in the larva state, and in the perfect state occurs on the leaves and the flowers.

The Corn Grub.—The corn crop has several formidable enemies to contend with, and among them is the grub, which sometimes literally destroys whole fields, or damages the crop seriously One of the best and most convenient remedies—perhaps the very best ever suggested —is the application of *salt* as soon as the plant makes its appearance above ground, prepared and used in this way: Take one part common salt and three parts plaster or gypsum, and apply about a tablespoonful *around* each hill. It will be found to be a sure protection. The mixture should not come in contact with the young plants, as it may destroy them. This method has been tried over and over again by some of the best farmers of Pennsylvania, Delaware and Jersey, and when properly applied, has never failed to be perfectly successful. We hope our farmers, who have reason to fear the depredations of the grub the present season, will try this mixture, leaving a few alternate rows without the salt, and communicate to us the result.—*Germantown Telegraph.*

Is it the so-called "White Grub" that is here spoken of, or the Wire-worm? But both these insects burrow under ground to reach the corn, and it is incredible to me, that so minute a dose of salt as one-third of a tablespoonful, scattered on the surface round a hill of corn so as not to touch the corn, i. e. in a thin line about a yard long, could stop them on their travels beneath the surface.

The Curculio.—Take hemp tow, or anything else that will make good wrapping, and bind it around the tree two or three feet from the ground, having the band four or five inches wide. Then completely saturate the band with tar, and keep it so until the fruit is fully developed, and you will have no trouble in raising fine plums. My mother practiced this method more than thirty years ago, and has never known it to fail. A neighbor of mine says that he tried this method successfully on an apricot tree some two years ago. I have practiced it for several years on English plum trees, that never produced fruit fit for use until I made the trial. It must be done *soon* enough, continued *long* enough, and to succeed the bandage should always be kept wet with tar.—*J. H. Garrad, in Rural American.*

This proceeds on the hypothesis that the curculio has got no wings, and is compelled to climb up the trunk of the tree that it attacks. Unfortunately, however, for the new theory, it has got full-sized wings, and can fly with ease. If the insect did not fly, it would be impossible for it to search out and sting every plum on a tree so rapidly and completely as it often does. Fencing out the curculio by tarred bandages would be a good deal like fencing out the crows and black birds from a field of corn by a tight board fence.

Tobacco.—The cut-worm will troublet he plants almost as soon as set, by eating them off close to the bud: hunt them out and destroy them, and replace any missing plants. The green worm is next to be fought and killed, or he will destroy your tobacco. He commences depredations when the plants get a foot in height, or before, sometimes, and works till the tobacco is hung in the barn, and longer, unless picked off and destroyed. The eggs of the miller, which produce the worm, are laid on the under side the leaf, and are a little lighter color than the leaf, and of the size of a pin's head; all of these destroyed, are so many worms destroyed in embryo. The miller is of a gray color, with orange-colored spots on each side of the body, and about as large as a humming bird: has a long, trunk-like tongue; when not in use, is closely coiled up and not observable; they are seen hovering about during twilight, at which time they may be caught and destroyed.—*W. H. White on Tobacco Culture, in Rural American.*

Quite correct.

How to Kill Sheep Ticks.—I have recently been experimenting with coal oil for killing sheep ticks. I took a couple of ticks and dropped a little oil on them, and it killed them. I then took two or three lambs that were ticky, opened the wool, and applied it to the ticks After several days I examined them and found the vermin that were touched with the oil dead. I then applied it to about twenty lambs, with good results. Try it, farmers. Take a bottle and fill it full of common oil used for burning after putting in the cork, make a hole in it, and introduce a quill, and open the wool, and whenever the ticks are found squirt it in. The ticks will die, and the wool and sheep be improved. This is my experience. Try it.—*W B. Disbro. in Rural American.*

From what I know of the effects of kerosene upon insects. I think the above very likely to be successful, though it would be called "slow business" out West. The common practice with shepherds, in England, is to rub a portion of Blue Mercurial Ointment on the naked surface between the hind legs of every sheep at shearing time, which is supposed to kill the ticks over the whole body of the animal. Whether it really does so or not, I have no personal knowledge; but every physician is aware that salivation is produced in the human subject by repeated rubbings of this kind, which proves that mercury, when applied in this manner, penetrates the whole system.

In Economic Entomology what is now wanted, is extensive and carefully conducted experiments upon the best mode of counterworking the insect foes of the Agriculturist. If all the remedies published at various times in various agricultural journals were collected together, they would probably amount to at least ten thousand in number, each vouched for by its author in the most emphatic and persuasive manner. The very multitude of the prescriptions is enough to embarrass and bewilder the afflicted patient. Which way is he to turn himself? Whom is he to believe? One physician recommends mercury, another sulphur, another sal-soda, another a hodge-podge of ingredients such as enters the witches' caldron in Macbeth. Can we wonder that under such circumstances the afflicted farmer, having tried three or four of the so-called remedies and found them practically useless, often turns away in disgust, pronounces Entomology a humbug, and consigns the devotees of that science to a place which it would shock polite ears to mention more explicitly?

Rock Island, Ill., April 16, 1866.

Outlines of the Study of Insects.

In these papers it will be the object of the writer to present, in as familiar language as possible, the leading points in the structure of insects, their relations to other animals, their mode of development, the forms of the different groups, and the special characters by which they may be recognized. These lessons will in great part be purely theoretical, as practical entomology, or the relations of insects to agriculture and the means of arresting their attacks are abundantly treated of in the other columns of this paper.

GENERAL VIEW OF INSECTS.

The animal kingdom was divided by Cuvier into four branches, the Radiata, Articulata, Mollusca and Vertebrata. He perceived that the essential point of difference which separates the articulates from all other animals, was the fact that their bodies were invariably made up of joints or cylinder-like rings which protect the organs within. In this respect an articulate animal differed from the soft massive sac-like shell-fish, such as the clam or oyster, which is often protected by a calcareous shell, and from the radiate animal, or star fishes and jelly fishes, whose organs or anatomical systems are arranged concentrically about the alimentary canal which forms the axis of the body; and lastly, from the vertebrate whose solid skeleton of lime forms the central support of the body.

That this classification is in exact accordance with nature Von Baer demonstrated, when following close upon the researches of Cuvier, by independent investigations into the growth of animals he showed that the vertebrate embryo first developed a bony skeleton which gradually closed around the nervous system and served as points of attachment for the muscles; that the young mollusc first appears as a simple sac or bag containing the viscera lodged within, and it is comparatively late in life that its shell grows about it; and that the young radiate from the first shows a radiated structure, while the young articulate first develops an outer jointed body-wall, through which the stomach, nerves and arteries can be seen gradually forming.

The articulates are by far the most numerous in species of either branch, the insects alone being supposed to number upwards of 500,000 species. The jointed worm seems to have been selected by nature as affording almost an infinity of modifications arising from variations in the number of rings, their relative size, and in the number and form of their appendages.

The idea of articulation which pervades this immense group of animals is seen best exemplified in the worm. The earth worm is long and slender-jointed, the body gradually tapers towards the head and opposite extremity. (Figure 1 shows a cross section of a worm.)

Upon making a section of the body we find the muscles attached to the inside of the body-wall, that the nervous system—which consists of a single cord, enlarging in each ring into a guaglion or nerve-knot, which in the Crustacea and Insects is doubled —rests upon the floor of the cylinder, the alimentary canal occupies the centre, while above it just under the back rests the heart or so-called dorsal vessel, consisting of a tube which pumps the blood from the tail towards the head, whence it flows in different currents back through the general cavity of body and returns in veins often incomplete. The breathing apparatus is also tubular like the other organs thus formed to pack closely in the tubular body. In the higher worms the breathing tubes or branchiæ are placed around the mouth. Very different from these are the air tubes or tracheæ of insects which as in the figure (2 *g*) enters through holes in the side of the body above the insertion of the legs, and ramify throughout the entire system, thus oxygenating the blood.

There are three grand divisions or classes of articulates, the Worms, Crustacea and Insects.

The worm is long and slender, composed of an irregular number of rings, all of very even size. Thus while the *size* of the rings is fixed, the *number* is indeterminate, varying from 20 to 200 or more. The outline of the body is a *single* cylindrical figure. The organs of locomotion are fleshy filaments and hairs (Fig. 1 *f*) appended to the sides.

The Crustacean, of which the lobster is an example, is composed of a determinate number (21) of rings in the typical forms, which are gathered into two regions, the head-thorax (cephalothorax) and hind body or abdomen. In this class we have first introduced true jointed legs attached both to the head-thorax and abdomen. In the Insects the rings are arranged into three groups.

The number of rings is twenty—seven in the head, three in the thorax, and ten in the abdomen. Thus, while in worms in which the abdomen greatly preponderates in size, the head is no larger than a single ring of the body; in the Crustacea the head-thorax is larger than the abdomen; in Insects there is the most equable proportion between the three regions; the head in the highest insects being but little smaller than the thorax, and the thorax not much smaller than the abdomen.

Thus the mass of organization is thrown forward towards the head; the organs of sense and locomotion have their greatest development over the organs which perform the functions of vegetable life, such as reproduction, and respiration, and digestion. Insects also differ from Crustacea in having wings and tracheæ (Fig. 2 *g*) of which the last serve to aerate the blood inside the body, while in the Lobster or Crab the gills are attached to the legs on the outside of the body, and thus act very imperfectly as lungs.

Size is an important element in classifying articulates, as those whose forms are most compact and consequently smallest, are in a general sense physically and psychologically of the most compact and of the finest quality, just as in man it is the finest quality, and compactness, and symmetry of structure that determines high intellectual and physical ability. The earliest insects of geologic ages were huge, vast, misshapen, entomological monstrosities like the mammoths and ichthyosaurus among vertebrates. The Honey Bee is of the size and compactness that affords a *type* of the highest physical and physiological development among insects, and thus stands at the head of the articulate series. The body is tough, compact, well knitted together. Its nervous system approaches nearest to that of vertebrates, as its brain is larger and better developed than in other insects. Its locomotive powers are immense, and its entire organization fits it for the highest grade of insect life. Witness its marvellous instincts, its social habits, the differentiation of the individual into sexes, and grades of sexes, for the better performance of the varied duties of a large and vast colony; its usefulness to man; its vegetable diet; though not carnivous, abundantly able to withstand the attacks of its enemies—all betokening the most equable development of the functions of both animal and vegetable life.

Contrast this with the Dragon fly and Ephemera, the lowest of insects. Their bodies are huge, lengthened, their abdomen worm-like. They are rapacious and carnivous. Their eggs are few in number. The young larvæ and pupæ pass their lives in the water. There is a great inequality in the development of the elements of their crust.

In classifying insects we must steadily keep in view the development and forms of the *crust* or wall of the body, and not the organs alone, which are but of secondary importance.

Fig. 1.

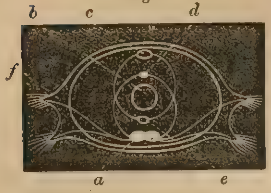
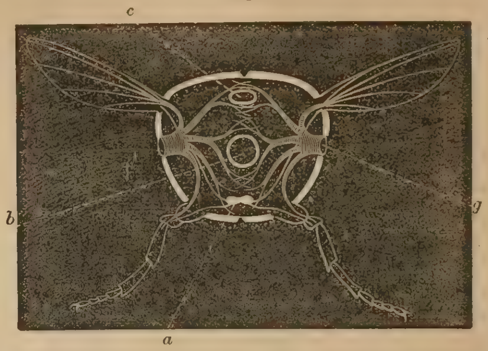


Fig. 2.



In Crustacea the standard of size would seem to be reversed, but the principal of *cephalization*, or concentration of parts headwards is more marked here than in insects. While in Insects the *head* is largest, in Crustacea the thoracic region is most developed, while in Worms the abdomen is largest, and the largest worms are highest in the scale.

In ascertaining the minor divisions of the insects we must keep in full view the principle of articulation and the relations of the rings to themselves and their mode of grouping, and not consider as of primary importance the appendages, which now first come into consideration. We shall find that all the minor divisions, or orders, sub-orders, families and genera, and even species, are but a more special working up of the primary principle of classification—which determine *rank* and *group*—and are all but modifications of an ideal form, becoming more special as the group becomes more limited, or smaller. As we approach *species* represented by the *individual*, slighter differences separate them, and are even apparent among individuals, enabling us by changes in form and ornamentation to detect differences between persons. No two individual insects can be found exactly resembling each other, just as no two men can be found to be precisely alike.

DESCRIPTION OF THE FIGURES.

Fig. 1 represents an ideal section of a Worm. *f* indicates the skin or muscular body-wall, which in each side is produced into one or more fleshy filaments tipped usually with bristles or hairs, which serve as organs of locomotion, and often as lungs. The nervous cord (*a*) rests on the floor of the cylinder, sending a filament into the oar-like feet (*f*) and also around the intestine or stomach (*b*) to a supplementary cord (*d*) which is situated just over the intestine, and under the heart or dorsal vessel (*c*). The circle *c* and *e* is a diagram of the circulatory system; *c* is the dorsal vessel or heart, from the side of which, in each ring, a small vessel is sent downwards and around to *e*, the ventral vessel. So that the circulation is a *closed* one in the higher worms, as well as the Crustacea and Insects.

Fig. 2 is an ideal section of a Bee. Here the crust is dense and thick, to which strong muscles are attached. On the upper side of the ring the wings grow out, while the legs grow out near the under side. The tracheæ (*g*) enter through the *stigma* or breathing pore, situated just under the wing, and its branches sub-divide and are distributed to the wings, with their five principal nervures as indicated in the figure, also to the dorsal vessel (*c*) the intestine (*b*) and the nervous cord (*a*). The two circles seen in fig. 1, representing the course of the blood vessels and nerves, are here left out so as to avoid confusion. The tracheæ and a nervous filament are also sent each into the legs and wings. The tracheæ also are distributed to the dorsal vessel and intestine by numerous branches. A. S. P.

Note on Black-Knot.

BY BENJ. D. WALSH, M. A.

In my article on Black-knot in No. 6 of the PRACTICAL ENTOMOLOGIST I incorrectly stated that the fungus growing on its surface is about the size of the head of a pin. It is only when seen through a pocket microscope that it appears so large as the *head* of an ordinary toilet pin. When viewed with the naked eye it is scarcely larger than the *point* of a dull-pointed pin.

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ACKNOWLEDGMENT.

We thankfully acknowledge the receipt of Three dollars from Mr. O. H. Peck, of Massachusetts, for this Paper.

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—ASSOCIATE EDITOR.

B. F. Scibert, N. J.—The insects you sent—oval, about one-fifth of an inch long, of a dull blue-black color, and with fine, long, silky hairs, especially on the thorax—are the *Serica tricolor* of Say. They arrived all alive and in first-rate order, and you did well in sending plenty of specimens. The species of this genus are numerous, and resemble one another very closely; and by examining several score out of the bountiful supply you furnished, I was enabled to ascertain, that the characters by which it differs from some very closely allied species are perfectly unchangeable, and do not run promiscuously those of one species into those of another. Although this insect is said to occur generally throughout the United States, yet I never met with it near Rock Island, though I have received it from my entomological friend, Dr. LeBaron, of Geneva, Illinois.

You say that "you find them very numerous as well as very destructive, as they have eaten all the leaves off your neighbor's and your own Pear-trees and Strawberry plants;" and that "the moment you touch the tree, they all drop to the ground." This is the first instance on record, so far as I am aware, of this particular species being injurious in the field or the garden. According to Say, "it abounds in hilly and mountainous situations, where, in the month of May, it may be seen flying about among the Whortle-berry bushes in great profusion." Harris states with regard to two other species of *Serica*—the *vespertina* and the *sericea*—that "they attack the leaves of the sweet-briar, on which they may be found in profusion in the evening, about the last of June." (*Inj. Ins.* p. 33.) A colored figure of *vespertina* is given in his plate II. fig. 14; and if you diminish the size and add some fine, silky hairs, the same figure would answer very well for our species.

These insects belong to the Order of Beetles (*Coleoptera*) and to the same great family (*Scarabæidæ*) in which are included our May-bug (or May-beetle) and our Rose-bug, and also the European Cockchafer—three ruinously destructive insects. It is not known where or how the larva lives, but it probably burrows under ground and feeds on the roots of living vegetation. The "dropping to the earth" when the tree, on which the perfect Beetle occurs, is touched, is not so common in this Family, as among the Snout-beetles (*Curculio* Family) and the *Chrysomela* family, which last includes the striped cucumber-beetles and several other injurious species.

Thos. Siveter, Iowa.—You refer to the article on "the Measuring Worm (*Ennomos subsignaria*)" in No. 7 of the PRACTICAL ENTOMOLOGIST, and you very justly state that the account there given of its habits does not at all agree with those of the Measuring Worm which infests your Apple-trees. No wonder. They are two entirely distinct insects. The insect that troubles you is evidently, from the very correct statement you give of its Natural History, the common Canker Worm—*Anisopteryx vernata*—which is as different from *Ennomos subsignaria* as a sheep is from a cow. Both, it is true, are Measuring Worms; but there are hundreds of distinct species of Measuring Worms found in the United States, each with its peculiar size, shape and color, its peculiar habits and its peculiar food-plant or food-plants.

The writer of that article, like many other learned men, supposed that those whom he was addressing were as familiar with learned names as himself, and that, by merely giving the scientific name of the insect which he was writing about, everybody would understand what particular species he referred to. There are, in fact, some things in that paper which I cannot understand myself, for example where he talks about the half-grown caterpillars "commencing their saltatorial exercises." "Saltatorial" means "jumping" or "leaping;" and if this particular Measuring Worm ever jumps or leaps, it is more than I ever saw any other kind of Measuring Worm do, though I am familiar with scores of different kinds. It is possible, however, that this may be a peculiar habit of this peculiar species, which, although it swarms in certain localities in the Eastern States, does not appear to be found in the West. But I have myself bred from the caterpillar another species of the same genus—*Ennomos magnaria*—which agreed with the *subsignaria* in spinning a loose cocoon of open net-work about the end of August and in coming out into the moth state the same season, viz: on Sept. 27. This caterpillar fed upon oak, while the *subsignaria*, if I remember right, is said to feed chiefly upon elm. But it performed no "jumping" or "leaping" operations whatever while it was in my breeding-cage.

You will find figures of both male and female Canker Worm moths in Harris's *Injurious Insects*, pp. 461—2. The other insect, which, as it swarms chiefly in cities, and especially in New York, may be called the "City Span-worm," is not noticed in that work nor in Dr. Fitch's *New York Reports*. The leading points of difference in the Natural History of the two Insects may be thus briefly stated:—In the Canker Worm it is the male moth that has wings, and they are ash-colored; in the City Span-worm both sexes have wings, and they are satiny-white. The Canker Worm goes under ground to pass into the pupa or chrysalis state; the City Span-worm goes to pupa in a thin gauzy cocoon which it spins among the twigs and leaves of the tree it inhabits. The Canker Worm generally lies in the pupa state till the following spring, though a few come out in the moth state late in the same autumn, and on warm days during the winter; the City Span-worm comes out into the moth state the same summer, and not many weeks after it has gone to pupa. The Canker Worm occurs chiefly on apple and elm trees, although it is sometimes found on cherry, plum, basswood, &c.; the City Span-worm, unless my memory fails me, is said to be found chiefly on the elm and only occasionally on other shade trees, but never on fruit trees. Hence it is evident that the two species must be attacked in very different methods; and that tarred bandages, leaden troughs filled with oil and placed around the butts of infested trees, &c., &c., which, when properly applied, are effective remedies against the Canker Worm, whose moth comes out of the earth and in the female sex is wingless, would be of no earthly use against the City Span-worm, whose female moth is winged and comes out among the twigs and branches of the trees it infests.

You will oblige me, as you seem to have more Canker Worms than you know what to do with, by sending me by mail a few dozen of them, packed in any kind of small box, with leaves enough to last them on their journey. The insect is not found near Rock Island, and I wish to breed it myself, so as to examine into its habits.

H. B. Howarth, Wisconsin.—The insects you send, with an enquiry whether they are not "the flies which produce the Chinch Bug," are the *Capsus oblineatus* of Say, otherwise named by Beauvois as *Phytocoris linearis*. You will find the species figured in Harris's *Injurious Insects*, p. 201, and another figure with an accompanying article by myself in the *Prairie Farmer*, May 2, 1863. It is a very common and abundant species throughout the Northern States, and, as you may see from the passages referred to, sometimes does a great deal of damage. Like the Chinch Bug, it passes the winter in the perfect or winged state, which accounts for your finding it under shocks of corn in the middle of November. You notice that it has "the same disagreeable smell as the Chinch Bug;" but this it has in common with all the true Bugs (Order *Heteroptera*) which are vegetable feeders and not cannibals; for example, the common Squash Bug (*Coreus tristis*)[*] and the Bed Bug. Not only is it a distinct species from the Chinch Bug, but it belongs to a distinct genus and even to a distinct Family.

You must disabuse yourself of the popular idea, that after an Insect has arrived at the perfect state, or in other words after it has obtained wings, it ever changes into any other kind of Insect. Many believe that Beetles change into Butterflies, Butterflies into Bugs, Bugs into Bees, and so on *ad infinitum*; and I once noticed a paragraph which ran the rounds of the Agricultural Press, gravely asserting that the common Rose-bug (*Macrodactylus subspinosus*) usually shed its yellow wing-cases and changed into a Horse-fly (*Tabanus*.) This is a mere delusion. No such change can or does happen. It is as impossible as for a Cow to shed her horns and turn into a Horse. All Insects pass through four stages only, 1st the egg, 2nd the larva, 3rd the pupa, 4th the perfect insect, when in almost all species wings are acquired, and in all species the male and female pair, the female lays her eggs, and then both male and female, having run their appointed course, die. In the human species and other vertebrate animals we may trace an anology with the above four stages as follows:—1st, the fœtus in the womb; 2nd, the baby feeding upon milk and without food at first; 3rd, the child feeding upon solid food and furnished with teeth; 4th, the adult man or woman, distinguished from the child by well known sexual characters and capable of propagating the species. The chief difference in the two cases is, that in Insects the change from one state to another takes place suddenly by a sudden moulting of the skin, or rather what is properly speaking the external skeleton, whereas in vertebrate animals it takes place slowly and gradually. For example, we can fix no precise day, and even no precise month, and scarcely any precise year, when the Baby becomes a Boy, or when the Boy becomes a Man, while it often takes but a few minutes for a Chrysalis (pupa) to change into a Butterfly, or a Caterpillar (larva) to change into a Chrysalis, and we may watch the whole process with the greatest ease, from beginning to end, by devoting an hour's attention to it.

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[*] Figured Harris's *Inj. Ins.*, p. 194.

In a very few species of Insects, such as the common Walking Stick or Prairie Alligator (*Diapheromera femorata*)* the perfect insect never has any wings at all; and in a few others, such as the common Bed-bug and the Flea, the Perfect Insect has only rudimental wings, or short stumps of wings, such as we usually see in the Pupa. But even here we may distinguish the different stages by the successive moultings, and we may know that the insect has arrived at the perfect state by its copulating. It is a universal rule that larvæ and pupæ never copulate, for the same reason that calves and lambs never copulate, i. e. because they are as yet in an immature state.

You will find the Natural History of the Chinch Bug well explained by Mr. Riley in an article in No. 6 of the Practical Entomologist (pp. 47—8.) The only point in which I differ from him is, that I believe that there are more than two broods of them every year, and probably as many as four or five in this latitude.

C. Cook, Mass.—The small cocoons you send from off the twigs of apple-trees contain a black pupa from which I have bred several specimens of a very minute moth, apparently undescribed. I am about to forward one to Dr. Clemens, who has made these small moths his special study, and who will probably name and describe it. All the specimens sent seem to belong to the same species.

From the mass of cocoons found attached to the egg of the Tent Caterpillar of the Apple-tree, which you formerly sent, I have bred several specimens of the very same species of *Microgaster* which we told you it was likely to produce, and also several specimens of another small Ichneumon-fly belonging to the genus *Hemiteles*. The question still remains to be solved, whether the larvæ of both these Ichneumon-flies lived as co-tenants in the body of their victim, the Caterpillar, and spun the mass of cocoons in common, or whether—which I decidedly incline to believe—one of them is parasitic upon the other, and if so which is parasitic upon which. From the fact that the *Hemiteles* came out several weeks before the *Microgaster*, I rather infer that the latter is parasitic upon the former. Please next year send me additional specimens, so as to solve this curious question.

Wm. Manlius Smith, N. Y.—You are quite right as to the cocoons of *Selandria ribis* (Winchell) not being mere "balls of earth," as was wrongly stated in the Practical Entomologist, No. 3, p. 23, but true silken cocoons. From the specimens you sent I have bred four specimens of the insect, which were a welcome novelty to my cabinet, and from which I perceive that Prof. Winchell was mistaken in referring the insect to the genus *Selandria*. It belongs to *Nematus*, having only one marginal cell, and therefore its true name is *Nematus ribis*. The female is very remarkable for having 10-jointed antennæ, while the male has the number of joints, viz. nine, that characterize the genus.

A very similar species of *Nematus* infests the Gooseberry and Currant in Europe, and it is perhaps the case that our American insect is the same species imported among us from the other side of the Atlantic. (See on the European species Westwood's *Introduction*, II. pp. 103—4.)

Charles Dadant, Illinois.—The eggs you send found in little slits in the bark of Pear-tree twigs are those of *Chloroneura malefica* (Walsh), a small green insect belonging to the *Tettigonia* family in the Order *Homoptera*. I published a description and figures of this insect in the *Prairie Farmer* Sept. 6, 1862, and of its egg-slits *Ibid.* April 4, 1863, p. 212, together with some account of its habits. The former article was reproduced in the *Proceedings of the Boston Society of Natural History*, 1864, pp. 314—317.

The similar egg-slits found in the bark of the Delaware grape-vine appertain to some other Homopterous Insect, probably to *Proconia undata*, a much larger species belonging to the *Tettigonia* family, which I know to oviposit in this manner in the grape-vine. You should have sent pieces of the twig containing the egg-slits, and not merely thin slices of the bark.

Jno. Flournoy, Mo.—The insects you send, found on the leaves and stems of the Chickasaw Plum, are some kind of Plant Louse (*Aphis.*) It is impossible to say what particular species they belong to, because they were simply wrapped in a piece of paper and reached me broken into a hundred fragments, and pressed as flat as a pancake. A naturalist might be able to say, with some degree of certainty, that a sausage contained dog's-flesh, from meeting with a dog's tooth in it; but it would puzzle even Cuvier or Owen to decide from such data whether the dog was a Terrier, a Spaniel or a Pointer.

As a general rule, almost every plant has its own particular species of Plant-louse; for example, that of the Apple is distinct from that of the Cherry, that of the Cabbage from that of the Currant, and so forth. They all live by sucking the sap of the plant they infest, and although the infested leaves often shrivel and curl up, yet it is impossible for them to be eaten bodily by this insect, for the simple reason that it has got no jaws to eat with—nothing, in fact, but a long beak to suck with. Consequently, "the stripping of the foliage" of your trees last year must have been caused by some entirely distinct insect—perhaps some kind of caterpillar. From the enormous rapidity with which Plant-lice breed, there is no doubt that if they were allowed to multiply without any check, they would in a few months ruin almost every plant on the face of the earth. But there are hundreds and hundreds of different insects that prey upon them voraciously, so that it is but seldom that they do material damage. I incline to believe, that in limited numbers, they operate as a summer pruning, and are therefore more beneficial than injurious to fruit-trees. In particular years the Hop Plant-louse has greatly injured the hops, and in other years the Grain Plant-louse in certain States has damaged the small grain considerably, but it is recorded to have been generally checked up in the end by myriads of Cannibal Insects, chiefly Lady-birds (*Coccinella*). I have myself seen the Devil's Darning Needles (*Agrion*) flying among my Currant Bushes and pouncing ferociously on the Plant-lice that swarmed on them. It is a good plan, and one which has long been practised by European gardeners, to collect a number of Lady-birds and place them on any plants that are grievously infested by *Aphis.* Fumigation with tobacco in a close room will kill Plant-lice on Green-house plants, and on choice garden plants, such as Verbenas, they may be destroyed by dipping the infested branches for a few minutes into strong soap-suds.

A. C. Hammond, Illinois.—You say that some of your Plum-trees are dying from the attacks of Borers, of which supposed Borers you forward three different kinds. The *first* of these—the "white grub"—is, as you suppose, the true Peach Borer, which in my article on Borers (No. 4, p. 27) was stated, on the authority of Dr. Fitch, occasionally to attack the Plum-tree. Hence your observations are valuable as confirmatory evidence of the fact, and of the further very remarkable fact that Plum-trees, when attacked by the Peach Borer, do not exude gum like Peach-trees. The *second* specimen—"the long, slender, brown worm"—is the larva of some kind of "Click-beetle" (*Elater*), none of which are true Borers, though a great many of them live in decayed wood, and a few of them attack the roots of living plants, when they are popularly called "Wire-worms." Most of these larvæ, like the specimen sent, are hard, shining, cylindrical, mahogany-colored insects, looking like an inch or so of brown wire cut off nearly square at each end. The *third* specimen—"the short, dark worm"—arrived in such bad order, having been eaten up almost bodily by the Peach Borer on the road, that all that I can say is that it is distinct from the other two.

I apprehend it is the Peach Borer that is the real author of the damage to your trees; and you must fight him on the same principles precisely as if you found him on a Peach-tree. Most certainly the Wire-worm (or *Elater* larva) would not invaded your trees, but for their already containing decayed matter, the handiwork of the Peach Borer.

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*Figured Harris *Inj. Ins.*, p. 147.

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PHILADELPHIA, JUNE 25, 1866.

SHALL THIS PAPER BE CONTINUED ANOTHER YEAR?

Three more numbers will conclude the first year's existence of this little paper, and we are glad to learn that the few pages that have been published have already proved valuable to many. Its history should be well known by all who receive it regularly, as each subscriber has been furnished with a copy from its commencement. Still there are some who seem to misunderstand the object of the Publication Committee of the Entomological Society in issuing the paper. Since we were obliged to stop the gratuitous distribution, and to ask the small subscription price of 50 cents a year, some appear to think that there is a screw loose somewhere, and that the Committee, growing tired of giving the paper away, want to put money into their own pockets. This is not so. The true object of the Committee is still the same as when the paper was given away, and that is the dissemination of a practical knowledge of Entomology among the agriculturists of our country, without fee or reward. So far from the Committee being pecuniarily benefited by the publication of this paper, they have, on the contrary, been obliged to put their hands into their own pockets to the extent of several hundreds of dollars in order to issue it regularly every month, and to distribute 8000 copies gratuitously. The receipts from advertisements and contributions from kind friends have assisted much, but with the present high price of paper and labor, they are soon exhausted. Certainly this state of things cannot be expected to continue, nor will the Committee undertake the publication of the Practical Entomologist another year unless they have some reasonable assurance that it will be self-sustaining.

We therefore take this early opportunity to say that unless we receive at least 5000 subscribers to the paper for the second year, at 50 cents per copy, its publication will not be continued. If the information imparted by the paper is not worth the small sum of fifty cents a year, it is not worth anything, and it is sheer folly for any one to expect the Committee to continue its publication, which is of no benefit whatever to them, at their own expense, for the benefit of those to whom the information is valuable.

The publication of the Practical Entomologist is yet an experiment, and it is to the interest of every Farmer and Fruit-grower in the country to see that it is permanently established. If the present readers of the paper wish its continuance, they will subscribe to it and also urge their neighbors to do the same. We therefore request that all who wish to subscribe for a copy for the second year, commencing with October, 1866, at 50 cents a year, will please forward their names and address *as soon as possible;* but we do not want the money sent until the issue of the first number, the receipt of which will inform them that 5000 names have been procured, and that the paper will be continued another year.

To make the continuation of the paper sure, let every one try to send us as many names as they can procure around their neighborhood, and if the desired number of subscribers is doubled, so much the better for the paper, as all the receipts will be expended upon its publication, in increasing its size and value.

Subscribers may rest assured of one thing, viz: that if we commence the second years' issue of the Practical Entomologist, we shall carry it through to the close of that year. But before we make the attempt, we desire to know, as acurately as possible, what the pecuniary prospect is likely to be.

Clover-Worms.

BY BENJ. D. WALSH, M. A.

There is a small caterpillar, which attacks clover in the stack or mow—sometimes in such enormous numbers as to entirely spoil the hay for use—the natural history of which is at present but imperfectly understood. I will first gather together what has been recorded on the subject, adding my own little mite of observations, and then point out the items which require explanation. It is to be hoped that any persons, who may hereafter meet with this insect, will forward me plenty of specimens to experiment on, and a full statement of the facts observed respecting their habits. I say "plenty of specimens," because I desire to breed both sexes of the perfect insect from these larvæ, and because, out of say a dozen larvæ of any particular insect, probably six will be destroyed by parasitic insects, (*Ichneumon flies, &c.*), and two or three will die of disease or unnatural treatment; thus leaving only three or four to arrive at maturity, all of which, as often happens, will be of one sex. Hence I should like at least a score specimens, packed in a small box, with a sufficient supply of clover hay to last them on their journey. Such a box may be forwarded by mail at the expense of a few cents. It is not necessary to take any precautions for admitting fresh air. Insects require but very little air indeed; and some of my most successful breeding has been carried on in closely corked bottles and vials.

Harris briefly refers to certain "clover-worms, which have been found in clover, in various parts of the country, and have often been seen spinning down from lofts and mows where clover has been stowed away, in such numbers as to be very troublesome and offensive." And on the authority of Mr. Sibley, of New Hampshire, he adds, that "these insects are of a brown color, and about half an inch long." He does not appear to have been personally acquainted with them, so as to determine to what Order of insects they appertained. (*Inj. Insects*, p. 456.)

On December 25th, 1861, I received from the editors of the *Prairie Farmer*, a few Clover-worms, which had been sent them by Mr. Wray, of McHenry County, in North Illinois, with a statement that they were found in millions in clover stacks, not uniformly throughout the bulk of the stack, but only in the lowermost two feet of it; and that wherever they were found, the hay was rendered totally unfit for use from the tangled mass of webs spun by them. Subsequently, Mr. Wray met with the same worms in "all the lower part" of a mow of the same hay stowed in his barn; and found that "in cold weather they keep very close in their webs, but crawl out in pleasant weather." "He has grown," it is added, "clover hay for fifteen years on the same farm, and this is the first appearance of the worm; and he believes that the eggs are laid on the green clover before it is cured, and that the sweating of the stack hatches them out." (*Prairie Farmer*, Feb. 15, 1862.)

Unfortunately my clover-worms all died before they attained maturity, but from the following description, which I copy from my journal, it is evident that they must be the larva of some small Moth, belonging of course to the order *Lepidoptera:*

Length, half an inch; diameter, 0.07 inch, tapering slightly at each end. Color a dirty greenish brown; beneath, yellowish brown; the first and last segment above shining, smooth and yellowish brown, with a few irregular whitish hairs; segments 2—11 each with a transverse row of about six long, whitish hairs, each hair proceeding from a lighter-colored tubercle with a dark central spot. Head rufous. Legs and prolegs normal, viz; six legs, eight abdominal prolegs, and two anal prolegs.—Wriggles much and runs backward like a *Tortrix*, suspends itself by a thread, and spins a whitish web while still in the larva state, and before the time arrives for its passing into the pupa state.

The following passages bear on the same subject:—

Clover Worms.—We are sorry to see by a letter from T. C. Randolph, Bucks Post Office, Columbiana County, Ohio, that this new pest of farmers, reported last year by an Indiana correspondent, is moving eastward. Mr. Randolph found "about eight inches of the bottom of a clover stack so full of these clover worms as to render the hay unfit for use. They are half an inch long, of a dark brown color, tapering each way, ridged, and hatched from cocoons resembling those of the bee-moth. Their excrement also resembles that of the moth, and is mixed all through the hay. With the thermometer at freezing-point they are lively, and were moving when the thermometer was at 6° below zero."

A sample of living specimens of the worms arrived in good order. We think it is a pest wholly unknown to Eastern farmers.—*N. Y. Sem. Tribune*, Feb. 16, 1866.

Clover Worm in the State of New York.—M. C. Remington, Auburn, N. Y., writes, Feb. 28:—"I read your account of the clover worm at the West, and dreaded its advent in the East. I little thought that, even then, this pest with its myriad host was stealthily doing its work of destruction on my own premises. Having occasion during last week to remove a stack of clover hay, I found the bottom of it, for two feet from the ground, full of brown worms about five-eights of an inch long, tapering both ways, ridged, with the extremities a little darker than the centre. The hay in spots was white with their cocoons, having the appearance of a white mould, which I took it to be, until on unloading the hay I found the wagon alive with these active agents of destruction. Can anything be devised to prevent their depredations? Would thoroughly salting be likely to prove beneficial? The subject, I think, is worthy of serious consideration." —*N. Y. Sem. Tribune*, March...1866.

It is pretty plain that these accounts all refer to one and the same insect, which occurs—in particular parcels of clover hay in particular years—in New England, New York, Ohio, Indiana and Illinois, and probably in most of the Northern States. Hence it is not, as the *N. Y. Tribune* infers, "a pest wholly unknown to Eastern farmers" up to 1866; for as long ago as 1841 Harris spoke of these worms as generally well known in the New England States, and Mr. Sibley is expressly quoted by him as finding them in New Hampshire. Of course Mr. Randolph's idea that his clover-worms "hatched" from the cocoons spun amongst the hay is a mistake. Like all such worms they must have hatched from very minute eggs, and, when they attained their full larval growth, they must have spun the cocoons wherein to pass into the pupa state, from which the moth would eventually make its appearance, couple, lay a fresh lot of eggs, and so repeat the old cycle of changes.

The points which need explanation in the Natural History of this insect are the following:—1st. Why does it only occur at the bottom of a clover-stack or a clover-mow? If, as Mr. Wray believed, the eggs were laid in the green clover before it was cured, it would be found generally distributed throughout the whole mass of clover-hay. Besides, an insect whose natural habit it is to feed on green clover leaves—as must be the case if the eggs, as Mr. Wray believed, were laid on the green clover—could scarcely live on dry clover-hay; or at all events it would not flourish so exorbitantly as this larva appears to have done, even if a few specimens might bear the unnatural change in their food. 2nd. It seems impossible that the parent moth can deposit her eggs in the clover hay after it is stacked, whether in the barn or in the open air; for in that case the worms would be found either exclusively or generally on the outside part of the stack or mow; whereas all accounts agree that they occur exclusively in the lowermost layer of the clover-hay, to which the mother moth could not possibly gain access to lay her eggs there. 3rd. It seems impossible that the clover-worm could have attained its full larval growth while feeding on the green clover, and have been afterwards carted off among the hay; for on that hypothesis they would occur evenly throughout the stack or the mow, not exclusively at the bottom. And besides, Mr. Randolph says, that "their excrement was mixed all through the hay," which proves that they must have fed very extensively on the hay after it was finally put away. 4th. Is it not the case that the clover-worm feeds exclusively on dry clover-hay, and never on green clover leaves, and that the parent moths deposit their eggs, at the bottom of an empty mow in the barn, among what little scatterings may be remaining from last year, whence they ascend into the new crop when it is put away into the barn? It is true, that both Mr. Wray, Mr. Randolph and Mr. Remington found the clover-worms very abundant, not only in mows in a barn, but in stacks in the open air. But it is possible that these gentlemen may be, all of them, in the habit of stacking their clover year after year on the same spot of ground, and upon the same foundation; the effect of which would be precisely the same, as if they had stacked in a barn where clover had been put away year after year. 5th. It is evidently only under certain peculiar circumstances that clover-worms can breed, at all events in such injurious numbers as to be noticed by the farmer; for the accounts of their occurrence are few and far between. What those peculiar circumstances may be, remains for future investigation; but I incline to believe that the essential condition is, that the infected clover-hay should be stacked in a place where clover was stacked the preceeding year.

The above are thrown out merely as suggestions, to be confirmed or disproved by future observation and experiment. If my hypothesis prove correct, the remedy to be employed against this Noxious Insect is plain, simple and effective:—*Never stack clover for two successive years on the same spot of ground; or if you are compelled by circumstances to do so, thoroughly cleanse and sweep out the foundation upon which you build, or the bottom of the mow, if you stack in a barn, so as to destroy the eggs from which the future clover-worms would hatch out.*

Rock Island, Ill., May 28, 1866.

CLICK-BEETLES.

Messrs. Editors:—I notice Harris (Inj. Ins. p. 45), and Prof. Tenney, (Nat. Hist., p. 427), have stated that the *Elateridæ*, or spring beetles, are enabled to spring from the ground by drawing out the spine and forcibly striking it against the edge of the sheath, thus springing from the ground by the force of the concussion.

Prof. Jaeger (Life of N. Am. Ins. p. 50) says, that the body being bent backward causes the spine to fly out of the sheath like a watch-spring, throwing the beetle into the air.

As the result of numerous microscopic observations, I have come to the following conclusion:—

The upper part of the sheath is prolonged toward the thorax, so that the spine, when drawn completely out, rests on its edge. Then, the insect pressing with some force on the thorax, the spine slips off the edge and flies back into the sheath. That portion of the back immediately above the spine, of course, forcibly strikes the ground, and the concussion throws the insect into the air.

There is hardly any elasticity to the spine, certainly not enough to throw the insect up in the manner described by Jaeger. Besides, the spine plays easily in and out of the sheath as any close observer can see. Yours truly, W.

Marlboro' Mass., May 28, 1866.

Observations, by Benj. D. Walsh:—Your statement is quite correct, and agrees entirely with what Westwood says on the subject. (*Introd.* I, p. 235.) Prof. Jaeger's book contains several errors, and cannot be safely depended on, any more than Emmons' New York Report. For instance, he figures the common *Limenitis Disippus* as *Danais archippus*—two very distinct insects which even belong to different Families, though their style of coloration is remarkably similar.

How to destroy Caterpillars on Fruit Trees.

The following mode of destroying the insects injurious to fruit trees, communicated to me by M. Scheffer of Mödling, is so simple and yet so efficacious, that I cannot do better than to lay it before my readers:—

M. Scheffer lays loosely rolled-up pieces of old cloth or blotting-paper in the forks of his trees. The caterpillars eat during the night, and while the dew is on the leaves in the morning, but they seek protection from the heat of the day, and creep into these rolls for that purpose. Thus it is only in the middle of the day that these rolls should be examined, and the caterpillars concealed in them destroyed.—*Köllar.*

Notes on DORYPHORA 10-LINEATA, Say.

(The Ten-striped Spearman—"Potatoe Bug.")

BY HENRY SHIMER, M. D.

This very destructive insect to the potatoe crops is making its appearance in great numbers. Their first appearance was about the 20th of May, and now the handsome insect may be seen every day, slowly flying around in quest of food and breeding grounds.

Last summer I conducted a series of thorough investigations of the nature and habits of the insect, commencing on the 18th of June and continuing throughout the season, making a daily record of all that I saw as I bred them through from generation to generation; during a portion of this time I was feeding several hundred together.

A few of the more important results may be briefly enumerated as follows:—

From an equal number of males and females, well fed and made as comfortable as possible in confinement, I obtained an average of 719 eggs to each female; but in the fresh, pure air, sunlight and freedom of nature, under propitious circumstances I have no doubt of its exceeding a thousand.

They laid some eggs every day for forty days, commencing July 15th, and ending on the 1st of September. The smallest average was in the first part of this time, being 7½ eggs per day to each female; the greatest average was about the middle of the time, 75 eggs; the last day they averaged 12½ eggs.

The eggs, as all who have seen them well know, are laid on their ends on the leaves of the potatoe plant, in somewhat regularly arranged, rather loose clusters, and sometimes in two tiers; they are yellow, elipsoidal, .08 inch by .045 inch in diameter; they hatch in about six days. The young, sluggish larva is at first mostly black; abdomen, dirty brown; it feeds voraciously, and in a few days becomes of a lighter color. At the end of seventeen days the full grown larva ceases eating, when it measures .5 inch by .25 inch in diameter; the abdomen being much the largest part, the thorax being only .15 inch wide, having increased its volume 200 times, or near twelve times its original weight daily, and moreover is so solid as to sink in the water; from these dates, it is no difficult task to apprehend its eating capacity.

At this time, as is well known to many, the head, posterior half of thorax, legs, and two rows of vitta on each side of the abdomen are black, the anterior half of the thorax yellow. Abdomen, large, tumid, orange, wrinkled, with a transverse groove on each segment; it uses the tail to aid in locomotion.

When touched, so as to produce alarm, it curls up into a ball and plays "possum."

After the seventeenth day, it disappears beneath the ground, if accessible; but if kept in an empty box, it lies on its back, where the process of transformation may be readily observed; as it lies on its back, in from three to five days it casts its last pupa skin by throwing it off upwards and backwards, slowly pushing it off mostly by the muscular writhing movements of its tail; it gradually becomes shortened in this operation, and assumes the pupa state, during which condition it only moves its tail, but that freely, being otherwise entirely helpless. The wings may now be seen developing, downward and backward, beneath the pupa skin. In ten more days, or thirteen days in all after it has ceased eating, and if permitted to enter the ground, the imago appears, being just one month from the time of hatching.

Thus in thirty-six days from the laying of the egg, the perfect insect appears, at first of a very pale light yellow color, the stripes but faintly perceptible, in about six hours the colors become bright and perfect, and the insect immediately begins to eat. The shell is at first comparatively soft, but continually grows thicker and firmer during its life, from the perpetual accretion of solid matter.

If permitted to transform in its natural position in the compact earth, as may be seen at the bottom of an earthed breeding-box, they all mature in precisely the same time, but more perfectly, none appearing with shrivelled wings, &c., as many in empty boxes did.

In about seven days the imago begins to pair, and at about the fourteenth day, on an average, begins to lay its eggs; thus in fifty days after the egg is laid the offspring begins to propagate, so that the first of the spring brood becomes fertile about the 10th of July, the second generation about the 1st of September, and the third and many of the last developed of the second, passes the winter in the pupa state in the ground, and in the following spring appears in the perfect state, from the middle of May to the early part of June, and in a few days, as we have seen above, begins to lay its eggs, and continues for forty days or more, or until the first laid begin to propagate, so that we have them of all sizes during the summer.

An imago developed in midsummer lived twelve days after its development without eating any food; one developed October 1st, lived until midwinter.

Those that laid the eggs above noted, became more sluggish thereafter, and ate much less. I supplied them with fresh potatoe tops daily, during the month of September; towards the last of the time they ate but little if anything. I kept them in a box during the winter, with a supply of potatoe tubers, but did not observe them eating anything. They passed the winter in a kind of semidormant condition, producing motion only when disturbed; they remained alive until the 1st of March, when they were accidentally exposed to cold sufficient to freeze the potatoes that were in with them. Soon after this I found them dead, of which accident I was very sorry, for from appearances I was hoping to keep them over till another summer; at all events it was very remarkable that they should have lived so long after the termination of the egg-laying season.

Regarding the natural means for their destruction with our present knowledge, the prospect is not very encouraging. In addition to the enemies enumerated by Mr. Walsh, (Prac. Ent., No. 1), I on one occasion found an undescribed species of Brachelytra, kindly determined by Mr. Walsh to be of the genus *Philonthus*, in one of my breeding boxes, which it entered during the night, and killed all the contained larvæ. But from these insect enemies we cannot hope for much assistance, as they can find plenty of more savory food in the freedom of nature; even birds seem to avoid them, and in all my breeding and entire summer of observations, I did not find one ichneumon or other parasite enemy. Hand-picking is tedious, but is the most practical method of disposing of them. The larva is very tenacious of life. I have seen them living after having been immersed in water for a whole day. When their food is scarce, they will devour the eggs and even prey on each other, (observed in confinement).

The potatoe rot was a great calamity, but this is far worse; and while so many plant largely of potatoes, and neglect entirely to pick off the insects, we must anticipate that they will spread from field to field, until the entire potatoe-raising portion of the Union is filled with, if not overrun by them; their subjugation though not impossible appears very improbable.

Mount Carroll, Ill., June 5, 1866.

Cutworms.

BY BENJ. D. WALSH, M. A.

By the term "Cutworm," is to be understood a sixteen-footed worm or rather caterpillar, of a dingy brownish color, often with indistinct stripes lengthways of its body, and often with six or eight small black humps or dots on each joint of its body, each hump terminating very generally in a minute hair. In the day-time they hide themselves under ground, and in the night they wander forth, like a hungry lion, seeking what to devour. "Wire-worms" and "White Grubs" are also called "cutworms" in some parts of the country; but these have only six legs, placed at the forward end of the body, and they produce beetles, the Wire-worms changing into "click-beetles" (*elater*), and the White Grub into the May-bug or May-beetle. Whereas the true Cutworms all produce moths, or "millers" as they are popularly called, belonging, so far as is known at present, to two distinct genera, *Agrotis* and *Hadena*. In *Agrotis* the male moth has feathered antennæ, the feathering, however, being quite short. In *Hadena* the male moth has no feathering to its antennæ. Otherwise, with a few trifling exceptions, the two genera are very much alike. In each genus there are numerous species known to exist in the United States.

Hence it is plain that it is as incorrect, or at all events as indefinite, to talk of "*the* Cutworm" as I formerly showed that it was to talk of "*the* Borer." Just as there are many different kinds of "Borers," each with its peculiar habits, so are there many different kinds of "Cutworms," each with its peculiar habits; and we must not be astonished if species are from time to time discovered, that differ, in their mode of attacking our crops, from any that had been previously known.

Most cutworms attack annual plants, growing either in the field or in the garden, such as corn, beans, tomatoes, lettuce, &c., cutting them off when they are quite young, either a little above the surface of the ground or a little below it. These seem to belong, all of them, to the genus *Agrotis*, or at least to be closely allied thereto, and they come out into the moth state mostly in July and August.

In Harris's *Injurious Insects*, p. 445, will be found a figure of one species in the moth state (*Agrotis tessellata*) which seems closely allied to, if not identical with another figured in Dr. Fitch's Ninth N. Y. Report, Plate iv., figures 2 and 3, and supposed by him to be the same as a species found in Europe, (*Agrotis nigricans.*) In Dr. Fitch's 2d N. Y. Report there will also be found figures of three other species in the moth state, (*subgothica*, *devastator* and *clandestina*,) Plate iii, figures 1, 2 and 6.

The only species of the genus *Hadena* which is known both in the larva and perfect moth state is the "Amputating Brocade Moth" (*Hadena amputatrix*) of Fitch, formerly called *amica*. A figure of this moth will be found in Harris's book, p. 450. The habits of its larva differ very remarkably from those of the ordinary cutworms. Instead of attacking annual plants, it attacks shrubs, such as currant and rose bushes, and even young trees, according to Harris, cutting off and devouring the young shoots in the night, and hiding itself under ground during the day. The moth comes out about the 1st of July. I have myself bred another species (*Hadena chenopodii*) from a naked pupa dug up in my garden (where I have many fruit-trees, currant bushes, &c.) April 26th, the moth coming out May 24; I also bred a third species, the name of which I do not know, from another naked pupa found by myself under similar circumstances. Hence, and from the fact that *chenopodii*, and another species closely resembling it, swarm round lamps in houses early in the summer in Rock Island, I infer that the genus *Hadena* commonly infests gardens where fruit-trees are grown, probably mounting the trees in the night to feed on their foliage; and that the different species, as a general rule, come out into the moth state earlier in the summer than those belonging to the genus *Agrotis*.

Harris says, that "in the summer of 1851, an agricultural newspaper contained an account of certain naked caterpillars, that came out of the ground in the night, and crawling up the trunks of fruit-trees, devoured the leaves, and returned to conceal themselves in the ground before morning." (*Inj. Ins.* p. 450.) An article has recently appeared in the *Prairie Farmer*, (June 2, 1866,) from the pen of Mr. C. V. Riley, in which there is an excellent account of the operations of certain cutworms, which mount fruit-trees in a similar manner in the month of May, and are especially hard upon the fruit-buds. Three separate species of larvæ, having these habits, are figured, and very fully described by Mr. Riley, and they appear to be distinct from any cutworms hitherto described, though the 3d species closely resembles the larva of the "Amputating Brocade Moth," differing chiefly in its smaller size, and in having "two black shiny marks" on the last joint of its body instead of one chestnut-colored shiny mark. The moths that belong to these Illinois cutworms are at present unknown, but it is to be hoped that the same hand that has commenced the story of their life will succeed in completing it. Taking everything into account, I incline to believe that they will turn out to belong to the genus *Hadena*. They were discovered and forwarded to Mr. Riley by Mr. J. W. Cochran, of Calumet, Ill., and the following communication from the latter gentleman, copied from the article in the *Prairie Farmer*, gives us a very good and vivid idea of their voracious propensities:—

> "They destroy low branched fruit-trees of all kinds except the peach, feeding on the fruit-buds first, the wood buds as a second choice, and preferring them to all other things, tender grape buds and shoots (to which they are also partial) not excepted—the miller always preferring to lay her eggs near the hill or mound over the roots of the trees in the orchard; and if, as is many times the case, the trees have a spring dressing of lime or ashes, with the view of preventing the May beetle's operations, this will be selected with unerring instinct by the miller, thus giving her larvæ a fine warm bed to cover themselves up in during the day from the observation of their enemies. They will leave potatoes, peas, and all other young green things for the buds of the apple and the pear. The long, naked young trees of the orchard are almost exempt from their voracious attacks, but I have found them about mid-night, of a dark and damp night well up in the limbs of these. The habit of the dwarf apple and pear tree, however, just suits their nature, and much of the complaint of those people who cannot make these trees thrive on a sandy soil has its source and foundation here, though apparently utterly unknown to the orchardist. There is no known remedy: salt has no properties repulsive to them, they burrow in it equally as quick as in lime or ashes. Tobacco, soap, and other diluted washes do not even provoke them: but a tin tube six inches in length, opened on one side and closed around the base of the tree, fitting close, and entering at the lower end an inch into the earth, is what the lawyers would term an effectual esstopper to further proceedings.
>
> If the dwarf tree branches so low from the ground as not to leave six inches clear of trunk between the limbs and ground, the limbs must be sacrificed to save the tree, as in two nights four or five of these pests will fully and effectually strip a four or five year old dwarf of every fruit and wood bud, and often when the tree is green utterly denude it of its foliage. I look upon them as an enemy to the orchard more fatal than the canker worm when left to themselves, but fortunately for mankind more surely headed off."

The tin tube recommended as an "esstopper," by Mr. Cochran is of course intended to prevent these cutworms climbing the trees, by means of its slippery surface affording no foothold to them. Consequently it is essential that it should be made of bright new tin, and not of some old rusty tin-pail. In California, on the same principles, they fence certain grasshoppers, that have wings too short to fly with, out of their fields by means of a strip of tin attached to the outer side of two boards, nailed together in the figure of an Γ. (*Smithsonian Reports*, 1860, p. 423.) No doubt tarred bandages or leaden troughs filled with oil would be as effective against these Cutworms, as, when understandingly applied, they are against the common Cankerworm.

Mr. Riley adds the following observations, having evidently obtained his information from the same source:—

> They work during the night, always descending just under the surface of the earth again at early dawn, which accounts for their never having been noticed in this their work of destruction. They never descend the tree as they ascend it, by crawling, but drop from the bud or leaf on which they have been feeding; and it is quite interesting to watch one at early morn when it has become full fed, and the tender skin seems ready to burst from repletion, and see it prepare by a certain twist of the body for the fall.

It seems that they have a Cutworm in California with similar habits to those of these Illinois insects, as we may learn from the following, which appeared in the *California Farmer*, of May 3, 1866:—

> CUT WORM.—A new pest has made its appearance among some of the vineyards in this section. It consists of a brown cut worm which comes up from the ground during the night time, and feeds upon the green leaves of the vine. It cuts off the stem of the leaf, thus threatening the destruction of the fruit. Where their havoc is the worst, hundreds of these worms may be found in the dry dirt around the roots of the vines. If any of our vintners have had experience with this pest, and can suggest a remedy, they will confer a great favor on the public by making the same known through our columns.
> —*San Jose Mercury of April* 19*th.*

As a large proportion of the insects of California belong to species distinct from those found on this side of the Rocky Mountains, the probability is that the above are not the same as any of the Illinois insects. But that they belong to the same genus, may be inferred with much plausibility. The habits of all animals are dependent upon their structure, and it is peculiarities of structure that constitute the genus. Consequently, where the habits are the same the genus will generally be the same, and conversely where the genus is the same the habits will, for the most part, with more or less trifling deviations, be essentially the same. Show me an insect that I never saw before in the world, and I can tell you pretty nearly the history of its life. Show a European naturalist a newly-discovered quadruped from America, and he will say at once what it feeds on, whether flesh or vegetable substances or both, how it procures its food, whether it is solitary in its habits or assembles in herds, whether it works by day or by night, whether it burrows underground, or lives on the surface of the earth, or climbs trees, and a host of other such particulars. All this he knows at a glance from the structure of the teeth, the eyes and the legs. And there are details in the structure of every insect, which to the eye of the practiced entomologist are equally significant and equally infallible.

◆

☞ It must not be supposed that, in order to arrest the inroads of every kind of caterpillar, or to prevent the injury caused by every beetle or fly, the PRACTICAL ENTOMOLOGIST gives a particular and approved remedy; or that it contains a number of such recipes. The principal point to be attained, is an exact knowledge of the enemy in every ascertainable state and situation; and to spread this knowledge, is the principal aim of its publishers, as means of destroying the insects, or preventing their reappearance, must be founded upon this knowledge.

The Canker Worm.—Finding a Mare's Nest.

BY BENJ. D. WALSH, M. A.

In the *Western Rural* of June 2, 1866, there appeared a communication from "a Subscriber" at Genesee, Mich., in which the writer throws doubt upon the well and long ascertained fact, that the female cankerworm moth crawls up the trees which she infests to deposits her eggs thereon. According to "Subscriber," she must, occasionally at all events, deposit her eggs on the ground. And this is his argument:—

> The theory that the moth of the canker-worm deposits eggs in the branches of the trees may be very good, but when theory comes in contact with actual observation and experience, it becomes men to consult with one another, and make further investigations and observations in order to arrive at just conclusions, and that the truth of a theory be thereby established.
>
> * * * * * *
>
> I will briefly state what my experience has been with the canker-worm. Last year a portion of my orchard was terribly infested by these destructive insects. The tops had the appearance of having been burnt over. Having watched their operations pretty closely last year, I tried an experiment this Spring, which has been, so far, very successful and satisfactory.
>
> I took a strip of heavy woolen cloth about three or four inches in width, and doubled it so that a strip when fastened around the tree is one and one-half, or two inches wide. The cloth can be securely fastened around the tree with twine. I put the cloth mid way between the ground and the lower branches of the tree. I then put as much tar on the cloth as will stay on. I made the cloth double thickness to prevent the tar from doing any injury to the bark of the tree. The cloth answers the double purpose of protecting the tree and holding the tar. This forms a bridge that the worms cannot get over. I go through the orchard two or three times a day, and each time I find a greater or less number of worms on the body of the trees below the tar. They are invariably travelling towards the top of the tree until they get to the tar, when they will travel around the body of the tree, and occasionally try a new place to ascend.
>
> I have observed some of the worms just as they were starting from the ground to commence their ascent, which led me to believe that the moth does not deposit its eggs in the tree, but in the ground where they are hatched into a worm.

Now if "Subscriber" had reflected for a moment, he would have been aware that the eggs of the canker-worm are minute objects, and that the young larva, when it first comes out of the egg and before it begins to feed, must also be very minute. Consequently if it had been only freshly-hatched larvæ that were ascending his trees, they would have been so small as to be scarcely perceivable by the naked eye of any but a practiced Entomologist. Moreover his theory is contrary to the general law, that insects lay their eggs in those situations only, where the natural food of the young larva will be most accessible, the blow-fly on meat, the cheese-fly on cheese, the dung-beetles on dung, &c., &c. The whole mystery is solved at once by the following acute remarks of the Editor of the *Western Rural*:—

> It is probable that the caterpillars which he saw crawling up the trees had fallen to the ground from the branches, and were endeavoring to regain their position. This they always do when they happen to fall or to be washed off by heavy rain. Probably it was after a shower that he saw them trying to ascend from the ground.

Driving nails into Fruit Trees.

BY BENJ. D. WALSH, M. A.

It is singular what a propensity just now men have to drive nails into fruit-trees, with the idea of benefiting them. Some indeed prefer boring auger-holes, but the nails seem the almost universal panacea of the day. Probably in 1867 it will be the fashion to take a draw-knife and shave all the bark off the trees in every orchard; and in 1868 we shall reach the millennium of horticultural perfection, and dress off all our fruit-trees with a jack-plane to some mathematical figure. The following is from the *American Farmer*, of June, 1866:

> A WRITER in *The California Farmer* states that two pomologists in the State benefited their fruit trees by driving nails into them near the roots. The growth of the trees was in no ways injured, and fruit was produced on trees that had heretofore been almost barren, while in other trees the quality and flavor of the fruit was improved.

But the Nail Disease prevails in Massachusetts, as well as in California; as witness the following from the *Maine Farmer* of May 24, 1866:

> MESSRS EDITORS:—I have seen an inquiry taken from your paper, for a remedy for the apple borer, and give you the following as a *sure remedy*, which will not impede the growth of the tree: With a small gimlet bore a hole in the tree within a few inches of the ground. Fill this hole with sulphur. If the tree be large, let the gimlet be correspondingly large. The hole should penetrate through the sap into the wood, from one-half to an inch. Press the sulphur into the hole and cover it with clay or shoemaker's wax, or a cloth, so tight that it cannot escape. In a short time the sulphur will be carried to all parts of the tree by the sap—and the borers will disappear also.
>
> If you have plum trees troubled with the black *wart* drive one or two nails into the tree.
>
> *Haverhill Mass., May 11th*, 1866.

But a correspondent of the *Boston Cultivator* is more merciful. Instead of driving the nails into the tree, he compromises the matter by driving them into the ground at the foot of the tree. Hear him, as quoted in the *Country Gentleman* of May 31, 1866.

> A correspondent of the *Boston Cultivator* states that he has been very successful in removing or preventing the Black knot, by burying iron turnings in the earth and then promptly cutting off whatever of the Black knot may appear. He thinks that driving nails in the ground beneath the tree will answer the same purpose as the iron turnings. We have no doubt this remedy, if faithfully applied, would prove entirely successful—especial care being taken to cut off promptly every vestige of the black knot on its first appearance. The iron and nails will be equally effectual if thrown into the river.

I fully agree with the Editor, that the nails would do just as much good if they were thrown into the river; but the best way of all to apply them would be on the loose fence-boards surrounding the orchard.

The only truly philosophical nail-driver, however, hails from Illinois. He drives his tenpennies upon chemical and mathematical principles, spike-nails for large trees and brads and sparables for seedlings. The following, which is printed in the *Prairie Farmer* of June 2, 1866, is indeed a gem in its way:—

> EDS. PRAIRIE FARMER:—I found on looking over my apple trees that the borer has commenced his work of destruction, and I set my wits to work to find something to destroy him, and think I have found just the thing.

> My remedy is this: I drive a nail into each of my trees and allow it to remain there. Now to some this might seem strange, but here is the way I reason on the subject. A nail driven into a tree nearly to its heart must necessarily come in contact with the sap of the tree, and this sap passing over the nail rusts it and the rust forms an acid which will not affect the tree, but at the same time it will kill all borers that are in the tree and will not allow others to enter it. I have seen borers penetrate the bark of a tree that had been prepared in this way, but they would back out and go no farther. For a small tree use a shingle nail and for larger ones use a nail in proportion. I wish some one would try this and report the result through your paper. "PECULIAR."

Now seriously—for this is a serious matter and should be tested in sober serious earnest—do pray, Mr. Peculiar, examine your theory a little more closely, before you try to induce your unfortunate "some one" to play the carpenter in his orchard. How much rust would form on the surface of a tenpenny nail in the course of a year? Probably a few grains by weight, which when distributed through the entire wood of a good-sized tree would be a very homeopathic dose indeed for each day of the year. This rust is, I believe, Oxide of iron, i. e. a combination of iron with the gas called oxygen; but who told you that this rust "would form an acid" with the sap? I am sure no Chemist is at present aware of any such fact. But suppose it is so. What is the chemical name of this acid? Is it oxalic acid, or malic acid, or sulphuric acid? Until you find this out, how do you know that "it will not affect the tree, but will kill all the borers in the tree?" But you say that "you have seen borers penetrate the bark of a tree that had been prepared in this manner" and then "back out and go no further." There you are manifestly mistaken. When borers first enter a tree, they are so small that you could not see them with the naked eye; and until they are ready to change into the perfect insect, they remain all the time inside the tree. But you seem to think that they roam about outside the tree, tapping it here and there like a woodpecker. You must have mistaken a caterpillar for a borer; and if you made such a grand mistake about an insect, you may have made other equally serious mistakes about the nails. Lawyers hold that if a witness breaks down on any one point, he breaks down upon all; and I therefore prefer not to accept your theory without further and better proof. Like the tailor in Shakspeare, when Falstaff offered him red-nosed old Bardolph as security for a debt, "I like not such security."

The New Potato Bug.

BY BENJ. D. WALSH, M. A.

I have just received specimens of this little pest from my friend, F. K. Phoenix, the proprietor of the large Nursery at Bloomington, Ill. He says that they are very bad on the potatoes and egg-plants in that neighborhood. Yesterday I had specimens sent me from Athens, Ill., which is situated in Menard County, a little west of the centre of the State; and I know that already last autumn they had reached a point in the interior lying thirty miles south-east of Rock Island, Illinois. But Bloomington is in McLean County, considerably to the East of the centre of the State, and is over a hundred miles in a straight line from the nearest point on the Mississippi River. In 1864 we know that this insect infested the potato at Warsaw, on the Mississippi; and if it travelled thence to Bloomington in the two years intervening between the spring of 1864 and the spring of 1866, it must have progressed at more than the average rate of fifty miles a year, which is what I assigned as its probable rate of eastward progression in the First Number of the PRACTICAL ENTOMOLOGIST. From Bloomington to the western borders of Indiana is only about seventy miles; so that by 1868 the Hooshiers will probably receive a friendly morning call from the stranger.

In the meantime, wherever the insect has once made a settlement, there it remains permanently, year after year; as the following communications, one from Iowa and the other from Illinois, show pretty plainly:—

> THE POTATO BUG—That terrible Colorado product, according to the entomologists—is upon us again in great numbers. May be some of the potato crop will be saved, and may be it will not. The Lady Bugs are here too—thanks to Colorado for sending us the antidote with the bane—if she did it! Let everybody encourage the lady bugs and render them every assistance possible. Wonder if President Johnson, now that he has got his hand in, cannot be induced to veto the Colorado *bug*, as well as the Colorado *bill*? If he will but do it, I pledge myself in advance to hurrah for at least one veto. (T. G., Warsaw, Ill., in *Prairie Farmer*, June 9, 1866.)
>
> THE POTATO BUGS ARE AGAIN RAVAGING IOWA.—M. H. BISHARD, Des Moines, says: "They are here by millions. The only chance of getting any potatoes this year is to make war upon the bugs. I take a paddle and basket and beat the bugs into it, and kill them with hot water. Our experience with potato bugs teaches that we can only raise potatoes by the sweat of our brow. Imagine me standing, basket and paddle in hand, in the midst of a patch of potatoes, with from six to twelve bugs on each hill, and you will have a photograph of my patch."—(*N. Y. Sem. Tribune*, June 12, 1866.)

Mr. Phoenix—who, as one of the largest and most enterprising nurserymen in the country, is pretty competent to form an opinion—thinks that there is no science of more practical importance to the Farmer than Economic Entomology; and that in every State in the Union, and in every good College in America, there ought to be a large Class of Students devoting their whole time to the subject. "Where there is one now," he adds, "there ought to be a hundred." I have long been of the same opinion myself; but then everybody thinks that I am a mere visionary enthusiast, riding my own special and peculiar hobby to death; and insects are such very small bugs, and Legislators generally are such very big bugs, that the infinitely large overlooks and despises the infinitely small. When, however, practical business men, like Mr. Phoenix, see the necessity of legislative action on the subject, and more especially now that the public mind is beginning to perceive, that five tons of Chinch Bug will destroy infinitely more green wheat than five tons of Elephant, though the Elephant is a unit and the Chinch Bugs are as the sand on the sea-shore; there is some hope that the eyes of Congress and of our State Legislatures may be gradually opened, and that they will cease to consider as beneath their attention, objects which—however minute they may be—annually pick the pockets of our American farmers of hundreds of millions of dollars.

Rock Island, Ill., June 15, 1866.

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—Associate Editor.

☞**Notice.**—Through the fault of Uncle Sam's Post-office, answers to correspondents—whom and how many I cannot tell—have miscarried between Illinois and Philadelphia. Those that find their communications unnoticed, will, therefore, please repeat them.

Thos. C. Wright, Ohio.—The insects sent, which had bored extensively into seasoned Hickory wood, are the same Painted Borer (*Clytus pictus*) as I figured in my Article on Borers, (P. E. No. 4, p. 29), only it is the male which is there figured, and the specimens you send are both females, and consequently have much shorter antennæ. They belong to the Order of Beetles, (*Coleoptera*), not to the Order of Bugs, (*Heteroptera*), as you conjecture, and have the usual transformations of their Order. The specimens sent reached Philadelphia alive and kicking, but were dead when I received them five days afterwards.

H. B. Howarth, Wisc.—The insects you now send are not the true Chinch-bugs, though they belong to the same family, (*Lygæidæ*), and have nearly the same habits. The Chinch-Bug is mostly black, with his back whitish, and a very conspicuous pair of black spots placed crosswise on it; those sent are of a uniform greenish-gray color with no conspicuous markings. This species is very common and abundant, but so far as I am aware, has not been as yet named and described. In size and shape it resembles the Chinch-bug: but the coloring is very different. About half of what you sent were winged, and in the perfect or full-grown state; the rest were the same insect in the larva or baby state. I have never known this species breed in excessive numbers, as the Chinch-Bug commonly does; but no doubt, in proportion to their numbers, they are equally destructive to vegetation.

Chas. H. W. Wood, Mass.—Thanks for the Cankerworms which reached me in good order, considering that they were four days on the road. You say of these Cankerworms that the principal trouble is to keep the full grown or growing worms from the trees, and that the protectors or tar stops the females from ascending. But these "full-grown or growing-worms" must have been hatched on the trees; else what did they live on before they were full-grown? I take it that they are individuals that have been blown off the trees by the wind or washed off by the rain, and afterwards re-ascend by the trunk. The real trouble, as I apprehend, is, that you don't apply your tarred bandages early enough in the season. Many females of this species come out in November, or on fine warm days through the winter; and to stop these from climbing the trees the tar must be attended to from the end of the autumn every fine spell through the winter. It is true this is a deal of trouble; but if done *effectually and thoroughly* one season in any neighborhood, you annihilate your foe for a dozen years to come. Recollect that the female is wingless, and cannot migrate at pleasure into your orchard from the other end of the County, like the winged female moth of the common "Caterpillar."

I do not believe that the male Cankerworm moth, when coupled with the female, would ever fly into trees, so as to give the female a chance to lay her eggs there. Butterflies and Dragon-flies (Snake-feeders and Devil's darning-needles) commonly fly coupled, but I never saw any moth do so. It requires very strong and robust wings to carry double in this manner.

Chas. Cook, Mass.—Dr. Clemens writes me word that the small moth produced from your cocoons is not, as I had supposed, undescribed. It is his *Bucculatrix pomifoliella*, described by him several years back, and the larva feeds on the leaves of apple-trees, as indeed the name indicates.

M. V. B. Hathaway, Vermont.—You inquire "what is the name and character of the insect which deposits froth resembling spittle upon grass in spring." It belongs to the Order *Homoptera*, the Family *Cercopidæ* and the genus *Aphrophora*, which in English means "foam-bearer." Near Rock Island we have three species, the 4-*notata* of Say, and the *quadrangularis* of Say, which are both pretty common and resemble each other pretty closely, and the *bilineata* of Say which is rare; besides the *obtusa* of Say and the *Proteus* of Fitch which are now referred to a different genus—*Clastoptera*—with different habits. The "froth" you speak of is caused by the young larva pumping out through the pores of its body the sap of the plant on which it feeds, and no doubt answers the purpose of concealing it from birds, cannibal insects, &c. You will always find a single larva in the middle of the froth, wingless of course, or with mere rudiments of wings; the perfect insect having full-sized wings. The ancients believed that this froth was "cuckoo-spit," and our French and English ancestors called it "frog-spittle," supposing of course that the tree-frogs voided it from their mouths. I have noticed this "froth" very abundant on the Red Osier Dogwood, (Cornus,) but which species of *Aphrophora* infests that shrub, I do not know, having never bred the perfect insect from the spittle. I never saw any "froth" upon "grass," as you say you have; but likely enough you may have a different species in Vermont from any found in Illinois. You could easily breed the perfect insect by placing the infested grass-plant in a pot of earth, and covering it with musketo-bar. But mind how you handle him, when he comes out in the perfect state, for he jumps like any flea; as indeed do all the Homopterous insects belong to the *Cercopis* and *Tettigonia* and *Membracis* families—or as they have been called in English the "Frog-hoppers," the "Leaf-hoppers," and the "Tree-hoppers." I have read somewhere that *Clastoptera Proteus* (of Fitch), which is prettily marked with black and gamboge-yellow, is a great pest upon cranberry vines in the East; but it must attack other plants as well, for it is very common near Rock Island where there are no cranberry vines.

E. Hall, Athens, Ill.—The insects you send are indeed the true, highly-improved, new Potato-bug, and Athens being so far in the interior of the State, the fact that they had already reached it a year ago is a confirmation of what I asserted last spring, viz:—that they would travel eastward at the rate of about fifty miles a year till they reached the Atlantic. There are two kinds of beetles that infest the Sweet Potato, one of a gold color, and the other striped with pale yellow and black. Both belong to the family of Tortoise-beetles, (*Cassida*,) so called from their flatness, and are, as you infer, pretty closely allied to the new Potato Bug. The pink ladybirds with black spots that you send, and which you say destroy the eggs of the Potato-bug, are *Hippodamia maculata*—one of the most useful friends the farmer has, for he is death on bark-lice, on chinch-bugs, and on Potato-bug's eggs. Several other kinds of Ladybirds also, to my knowledge, feed on Potato-bug's eggs.

Although, as you say, the Potato-bug first appeared with you last year on Solanum triflorum, a plant that you have been growing from Rocky Mountain seed since 1863, yet you could not have imported it along with the seed, because the seed must of course have been gathered in the fall, and this insect's eggs, if gathered in the fall, would not live till the following spring. Some insects indeed pass the winter in the egg state, the common "Caterpillar" of the apple-tree for example, but this is not one of them.

O. B. Douglas, Vermont.—The plum with some monstrosity in its development arrived in such a shrivelled state that I can make nothing of it. The small "bunches or sacks" attached to a twig are very remarkable and quite new to me. They contain eggs and are made by some insect or other—or possibly some spider—and that is all I can say about them. I have found on the White Oak numerous "bunches or sacks" likewise containing eggs, but differing from yours in being smoothly globular and of a cream-color, freckled with brown.

Prof. Sheldon, Iowa.—The moth you send is a fine male of the common Currant Borer, (*Ægeria tipuliformis*,) of which a figure was given in the P. E., p. 29, together with a short notice by myself of its habits.

Dr. Trimble, N. J.—I have already answered you once, but the MS miscarried. The large larva you send, with the statement that it is destroying many dwarf pear-trees near Hammonton, N. J. by boring them close to the ground, is manifestly that of some Longicorn Beetle, and I think belongs to the *Prionus* group. As it disagrees with the described larvæ of the genus *Prionus* in having very long maxillary palpi and long antennæ, I think it will not improbably prove to be the larva of *Orthosoma cylindricum*, which with us in Illinois is a pretty common insect. Authors indeed state that this species inhabits pine-trees; but I think this must be a mistake. It is common near Rock Island, where we have no pine-trees. True, it might breed here in pine lumber, of which we have plenty. But in 1861 I took great numbers of this insect near the inland town of Jonesboro', in South Illinois, where at that date they had neither pine-trees nor pine lumber, the natives of that region using "poplar" (tulip-tree) or "whitewood," where we northern folks who live handy to the pineries use pine. *Prionus laticollis*, as you are aware, breeds in different species of Poplar. *Prionus imbricornis* is our common species in Illinois, but where that breeds is, I believe, unknown. Your larva arrived in good order, and I hope to raise the perfect insect from it, and settle all doubts on the above question.

F. K. Phoenix, Illinois.—The cankerworm moths mostly come out in the spring and lay their eggs then, but a few come out late in the autumn and on warm days through the winter and of course lay their eggs shortly afterwards. This is what all the best writers say.

Fred. Blanchard, Mass.—You ask, "what are the most desirable works on Entomology for the beginner to have." Answer—Kirby and Spence's *Introduction to Entomology*, London, 1857, one thick duodecimo. Harris's *Injurious Insects*, one octavo volume, with plates. Westwood's *Introduction to Classification of Insects*, London, 1838—40; two thick octave volumes, with very numerous outline drawings.

Thos. Siveter, Iowa.—Thanks for the Cankerworms, most of which arrived in good health. The Potato Bugs you send are the genuine new and highly improved species—quite distinct from the old-fashioned blister beetles —respecting which see my Article in No. 1 of P. E. They are swarming this year at Rock Island, and last autumn I heard that they had already reached a point thirty miles to the South East of us. We have to thank the Eastern folks for the Bark-louse, the Locust-borer, the Hessian Fly and the Wheat midge. Now we are going to reciprocate the obligation, and furnish them with a Western Bug with true, go-ahead, western propensities. "Turn about is fair play."

Henry Shimer, Illinois.—The insects infesting the White Pine (*Pinus strobus*,) that you forward do not belong to the *Aphis* family, (Plant-lice) as you suppose, but to the *Coccus* family (Bark-lice.) The elongate white scale on the leaf was described by Fitch as *Aspidiotus pinifoliæ;* the downy patches on the bark as *Coccus pinicorticis*. But I believe they are the same species, the former containing the eggs, like the scale of the common Bark-louse of the apple tree, and the latter being the young larvæ with downy matter exuding from them. No one has yet obtained the winged males of this species; and until this is done the genus to which it belongs cannot be accurately determined. I suppose you are aware that the females in this family never acquire wings, and that the males, unlike the 4-winged Plant-lice, have only two wings. There was a large green cannibal larva, belonging to the Dipterous family *Syrphidæ*, that came along with the lice and was probably unnoticed by you.

Errata in No. 8.

Page 77, column 1, line 4, for "*Serica tricolor*" read "*Serica iricolor*."

Page 77, column 2, line 24 from bottom, for "all the true Bugs" read "almost all the true Bugs."

Page 78, column 1, line 3, for "without food" read "without teeth."

ACKNOWLEDGMENT.

We thankfully ackowledge the receipt of the following sums, donated for the support of the Practical Entomogist:—

George Hunt, Rhode Island	$2 00
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Fred'k. Blanchard, Massachusetts	1 00

Distribution and Habitat of Insects.

The distribution of insects is in exact proportion to the diffusion of plants; the richer any country is in plants, the richer it is also in insects. The polar regions, which produce but few plants, have also but few insects; whereas the luxuriant vegetation of the tropical countries feeds a numerous host of insects.

With respect to their habitation, insects are divided into those which live upon land and water.

Those which live in the water, either never leave that element, or are able to live at will, either in the water or on the earth, at least for a short time; for example, many water-beetles. Many live at certain periods of their development in water; at others, on land; such as many sorts of flies, and all the dragon-flies, which as larvæ and pupæ live in water, but as perfect insects on land, or in the air.

Land insects live either in the earth, under stones, in decayed wood, or in putrid animal substances. Of these some pass their whole lives in these places, others only during a particular period of their development. The larvæ of the dung-beetle live deep under the ground, while the perfect insect inhabits the excrement of animals; many of the larvæ of flies live in carrion or excrement, while the perfect insect flies about in the open air. A very great number choose the different parts of plants for their abode, as the roots, bark, inner bark, alburnum, wood, pith, buds, flowers, leaves and fruit. They change their abode in every new stage of their development. Thus the bark-beetle, which in the larva state lived under the bark, swarms in its perfect state upon the trees, the curculio of the apple-tree, the larva of which infests the bottom of the apple blossom, crawls on the trees, or on the surrounding ground; the mining-moth, which as a larva lives under the cuticle of the leaves, flutters in its winged state about the flowers and leaves.

A small number live upon other animals, on the skin, such as lice, or in the inside of the body, as the ox and horse breeze-flies (*Œstridæ*). The two latter leave their first abode before entering the pupa state, which they effect in the earth, and hover as flies round the animals to deposit their eggs upon them.

Most insects live solitarily, either without any definite dwelling, or they construct for themselves a house composed of various kinds of vegetables or animal matter; for example, many caterpillars. A few species live in society, such as bees, ants, wasps, &c.

By obtaining a general knowledge of the abode of insects, it is evident that the observer of the economy of insects will be able more satisfactorily to combat many that are injurious to him; thus he can, with little trouble, greatly diminish or entirely annihilate those that he has ascertained to live in society, or in places of easy access.—*Köllar.*

☞We have copies of the "Practical Entomologist," published in Philadelphia, from which we glean valuable information. Success to such a work.—*California Farmer.*

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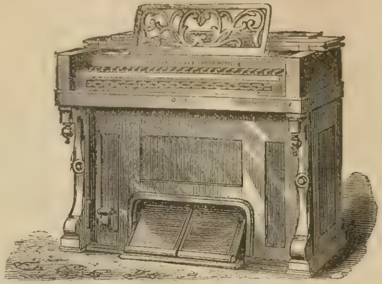

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THE
Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

VOL. I. JULY 30, 1866. No. 10.

The Practical Entomologist.

☞ Published at the Hall of the Society, No. **518** *South Thirteenth* Street, where all (except Western) communications should be addressed.

☞ TERMS—**50** cents a year, *in advance.*

☞ All subscriptions must date from the commencement of the volume.

☞ Our Western Correspondents will please send their communications direct to Benj. D. Walsh, M. A., Associate Editor, Rock Island, Illinois.

E. T. CRESSON,
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BENJ. D. WALSH, Rock Island, Illinois,
ASSOCIATE EDITOR.

PHILADELPHIA, JULY 30, 1866.

☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟

We repeat our request to those who feel interested in the permanent establishment of the PRACTICAL ENTOMOLOGIST, and who have not already sent in their names as subscribers for the second year, commencing with October 1866, to do so *without delay*, and not only send their individual names, but also those of their friends and neighbors. Almost every subscriber could induce one or more of his or her friends to subscribe 50 cents a year to a really useful paper.

Renewals come in pretty freely, and not only renewals, but some who now subscribe to only one copy, have put down their names for *ten*, *twenty* and even as high as *fifty* copies of the paper for the second year, intending, no doubt, to distribute copies among their friends and neighbors, and endeavor to secure their patronage for the third year. Many could readily afford to take five or ten copies of the paper and use them to much advantage by introducing it into their neighborhood.

We trust that our friends will exert themselves and that we will have our complement of 5000 copies subscribed for in time to announce the fact in the last number of Volume I, due on the 30th day of September 1866.

We take the liberty of inserting here a few extracts from letters received from subscribers in renewing their subscriptions; these will show how the paper is appreciated by those who see the grea importance of such a work.

A subscriber, from Illinois, says:

"As I regard your paper, I will rather go bail for fifty subscribers for the next volume, at 50 cents each, than have it stop. Don't think of giving it up—don't mention such a thing, but give us a chance one year more to spur them up."

Another, from New York, says:

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"I will subscribe for 10 copies of your valuable paper, and hope you will not be allowed to discontinne it through the apathy of the public. The study of our insect enemies and friends is of importance to the whole nation."

Another, from Virginia, says:

"I write to give timely notice of my wish to continue my subscription to the 'Entomologist' for the next year. Your Society has done a valuable public service during this year, and I hope you will be encouraged to continue."

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"You may consider me a subscriber for the future, and if it is necessary to pay double, I will cheerfully comply."

Another, from Ohio, says:

"Please put me down as a subscriber to the 'Entomologist' for the second year, commencing October next. I consider your little paper both interesting and valuable, and the small subscription price, fifty cents, is, I think, small indeed compared with the real value of the paper. Success to the enterprise."

Outlines of the Study of Insects.—II.

In our last article we endeavored to show that the classes of Worms, Crustacea and Insects were but modifications of a single articulated or jointed worm-like form, and that in all this unity there actually existed from the first, three quite different *types* or shapes, so that one need not confuse a worm with a Lobster, or a Lobster with a Honey bee. At first however, all *look* much alike, that is when in the egg, before the embryo is formed. The earliest form of all articulates is *wormlike*, that is, the embryos tend to become cylindrical, much longer than broad, and rounded off much alike at each end of the body.

In studying the lives of great men, we turn eagerly to the accounts of their childhood, and growth through the period of youth to adult life. So in studying insects we must trace them from the egg state, to the period of childhood, (the larva)—and from childhood to the adult fly-state.

At first the Worm leaves the egg as a little oval infusorium-like, microscopic body, covered over with little filaments or cilia, by the swift motion of which it circumnavigates a drop of water. Very soon it grows longer, and contracts at intervals, when the skin becomes partially infolded, giving it a ringed appearance, and it is at this time that we can tell whether the embryo is to be a lobster or worm, i. e. an *articulate*, or a clam or fish. The rings faintly marked out determine that in reality it is an Articulate and not a Mollusc (clam), or Radiate (Starfish). Soon the ciliæ disappears, regular locomotive paddle-like organs, grow out from the sides; feelers, and jaws and eye-dots appear on the front rings of the body, which are thus grouped into a head, though it is difficult in a large proportion of the lower kinds of worms for unskilled observers to distinguish the head from the tail. Thus we see throughout the growth of a worm, no attempt at subdividing the body into regions, as a head, thorax and abdomen, each provided with distinct organs, but only a perfection of the individual rings themselves as they advance in life. Thus in a worm, of which fig. 1, in the preceding article is a cross section, we see each ring is plainly distinguished into an upper and under, and in addition to these, a well marked side-area, from which oar-like locomotive organs grow out. It is on this side area in the rings composing the head of worms, that the eye-dots, feelers and jaws are situated. We see this arrangement distinctly in the Worms, but less apparently in the Crustacea and Insects, whose heads are made up not of a single ring, as is very generally supposed, but of *six and probably seven*, being in insects twice the number of those comprising the thorax.

In some of the low intestinal worms, such as the Tape Worm, each ring in the hinder two-thirds of the body is provided with a distinct portion of the ovary and male sperm-gland, so that when the body becomes broken up into its constituent elements or rings, as often occurs naturally in these low forms for the more ready propagation of the species, since the young are exposed to many dangers while living in the intestines of animals,—each ring may become a living independent worm, and add new rings to its body by the simple subdivision of the original one. This fact proves that in the *worm*, the vitality of the animal is very equally distributed to each ring. If we cut off the head or tail of some of the lowest of these worms, the pieces will become a distinct animal, but an insect or crab sooner or later dies when deprived of its head or tail, (abdomen).

The young of all Crustacea first begin life in the egg as oblong flattened worm-like bodies, each end of the body repeating the same form. The young of the low Crustacea, such as the Barnacles, and some marine forms like the Sow-bugs, and some lowly organized parasitic species inhabiting the gills of fishes, are hatched as microscopic embryos which would readily be mistaken for young worms. In the higher Crustacea such as the fresh-water lobster, the young when hatched, does not greatly differ from the parent, but it goes through the worm-like stage within the egg.

It is thus with Insects. Within the egg at the first dawn of life they are flattened oblong bodies curved upon themselves. Just before hatching their bodies unbend, they become more cylindrical, the limbs bud out on the sides of the rings, the head is clearly demarked, and the young Caterpillar steps forth from the egg-shell ready armed and equipped for its riotous life.

As will be seen by the figures below, the legs, jaws and antennæ are first started as buds from the side of the rings, being simply elongations of the body wall, which bud out, become larger, and finally jointed, until the buds arising from the thorax or abdomen become legs, those from the base of the head become jaws, while the antennæ and palpi sprout out from the front rings of the head. Thus while the body of all articulates are built up from a common embryonic form, their appendages also so diverse, when we compare a lobster's claw with an insect's antennæ, or a spider's spinneret with the hinder limbs of a Centipede, are yet but modifications of a common form, adapted for the different uses to which they are put by these animals.

The changes which an animal undergoes while growing is called its *metamorphosis*. This metamorphosis is of course less marked in those animals whose forms are low and simple and which therefore do not depart greatly from the early embryonic stage. As we ascend higher, the changes become more marked, until in the true Insects, where the larva is so strikingly different in the majority of species, from the pupa, while the pupa again, assumes quite a different form from the winged fly we have a most thorough transformation, which led early observers to state that Insects differ from other animals in passing through a *metamorphosis*, not knowing as we do now, what surprising changes all animals pass through in order to reach the adult state.

EXPLANATION OF THE FIGURES.

Fig. 3 represents the embryo of a worm. *a* is the middle tentacle of the head; *e* one of the posterior tentacles; *b* the two eye-spots at the base of the hinder pair of feelers; *c* is one of a row of oar-like organs (*cirri*) at the base of which are inserted the locomotive bristles, with the cirri serving as swimming and locomotive organs; *d* the caudal styles, or tail-feelers. (From A. Agassiz).

In this figure we see how slight are the differences between the feelers of the head, the oar-like swimming organs, and the caudal filaments; we can easily see that they are but modifications of a common form, and all arise from the common limb-bearing region of each ring of the body.

The alimentary canal, with the proventriculus, or anterior division of the stomach, is seen to occupy the middle of the body; while the mouth opens on the under side of the head.

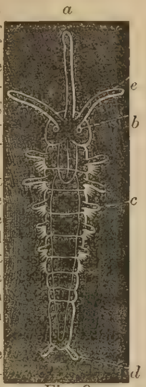

Fig. 3.

Fig. 4 represents the young of the fresh-water Lobster (Crawfish) before leaving the egg. The body is divided into rings, ending in lobes on the sides, which are the rudiments of the limbs. *b* is the rudiment of the eye-stalk, at the end of which is the eye; *a* is the fore antennæ; a^1 is the hind antennæ; *c* is one of the maxilla-feet; c^1 is the first pair of true feet destined to form the huge "claw.', (From Rathke). Thus the eye-stalk, antennæ, claws and legs are moulded upon a common form, and at first are scarcely distinguishable. Here we see the embryo divided into a head, thorax and a tail

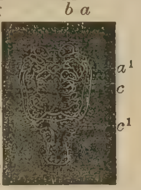

Fig. 4.

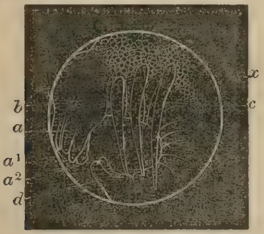

Fig. 5.

Fig. 5. A Case-fly. *Phryganea*, (after Zaddach), in the egg, with part of the yolk (*x*) not yet enclosed within the body walls. *a* antennæ; between *a* and a^1 the mandibles; a^1 maxilla; a^2 labium. *b*. the separate eye-spots, (ocelli) which afterwards increase greatly in number and unite to form the compound eye. The "neck" or junction of the head with the thorax is seen at the front part of the yolk mass; *c* the the three pairs of legs, which are folded once on themselves; *d* the pair of anal legs attached to the tenth ring of the abdomen, as seen in caterpillars, which form long antennæ-like filaments in the Cockroach and May-fly, etc. The rings of the body are but partially formed; they are cylindrical, giving the body a worm-like form. Here as in the other two figures, though not so distinctly seen, the antennæ, jaws and last pair of abdominal legs are modifications of but a single form, and grow out from the side of the body. The head-appendages are directed forwards, as they are to be adapted for sensory and feeding purposes; the legs are directed downwards and they are to support the insect while walking. It appears that the two ends of the body are perfected before the middle, and the under side before the upper, as we see the yolk mass is not yet enclosed and the rings not yet formed above. Thus all articulates differ from all vertebrates in having the yolk mass situated on the back, instead of on the belly as in the chick, dog, or human embryo.

A. S. P.

Chinch Bugs

"If any Western rustics are verdant enough to suppose that chinch bugs cannot be out-flanked, headed off and conquered, they are entirely behind the times. The thing has been effectually done during the past season, by Mr. Davis, Supervisor of the town of Scott, Ogle county, Ills. This gentleman had a cornfield of a hundred acres, growing alongside of an extensive field of small grain. The bugs had finished up the latter and were preparing to attack the former, when the owner, being of an ingenious turn, hit upon a happy plan for circumventing them. He surrounded the corn with a barrier of pine boards set up edgewise, and partly buried in the ground, to keep them in position. Outside of this fence deep holes were dug, about ten feet apart. The upper edge of the board was kept constantly moist with a coat of coal tar, which was renewed every day.

"The bugs, according to their regular tactics, advanced to the assault in solid columns, swarming by millions, and hiding the ground. They easily ascended the boards, but were unable to cross the belt of the coal tar. Sometimes they crowded upon one another, so as to bridge over the barrier, but such places were immediately covered with a new coating. The invaders were in a worse quandary than that of Butler and Weitzel at Fort Fisher, and, in that state of mind, crept backward and forward until they tumbled into the deep hole aforesaid. These were soon filled, and the swarming myriads were shovelled out of them literally by wagon loads, at the rate of thirty or forty bushels a day—and buried up in other holes, dug for the purpose, as required. This may seem incredible to persons unacquainted with this little pest, but no one who has seen the countless myriads which cover the earth as harvest approaches, will feel inclined to dispute the statement. It is an unimpeachable fact. The process was repeated till only three or four bushels could be shovelled out of the holes, when it was abandoned, The corn was completely protected, and yielded bountifully."—(*Prairie Farmer*, copied in *Valley Farmer*, June 1, 1866.

From what I have seen of the Chinch Bug, I have no doubt that the above is substantially correct.

B. D. W.

◆

THE PRACTICAL ENTOMOLOGIST.—This able and highly instructive journal commences in the May number a series of articles designed as elementary lessons in the science of Entomology, for the instruction of young persons and others who may wish to acquire some knowledge of this subject. It will prove a valuable feature and we hope will excite a greater general interest and enlist a larger number of intelligent observers of the habits of insects. Every farmer boy in the country should subscribe for the *Entomologist*. Only 50 cts. a year.—*Sorgo Journal.*

Doctors Differ.

BY BENJ. D. WALSH, M. A.

Those who read Agricultural Journals must have frequently noticed cases, where one Correspondent strongly recommends some infallible remedy against a particular Noxious Insect, and a few months afterwards comes an answer from another Correspondent, saying that he has tried the remedy and found it worthless. By way of practical illustration, I will give a few instances of the kind, taken at random from various sources. The following is from the Proceedings of the New York Farmers' Club printed in the *N. Y. Tribune*, July 14, 1863:

> *Oil upon Fruit Trees.*—Mr. Hopkins says further: "In your discussions before the Club, oil is recommended to be rubbed on to fruit trees. I can only say, in regard to a single instance. A gentleman in Warsaw, Wyoming County, N. Y., applied common tanners' oil to his, both pears, plums, and cherries, and he killed them every one. They were thrifty, well-doing, healthy, and very productive before, but they never bore fruit or leaf afterwards."

The next example is from the same publication, but of three years later date, (June 12, 1866.)

> *Curculio—New Remedy.*—Mr. Carpenter related the case of some one, who has succeeded in growing plums by keeping sheep in the orchard; and it was supposed by the owner, that the odor arising from the sheep affected the insects and kept them away.
>
> Mr. Hicks said his neighbors keep sheep, but it does not keep away the curculio.

But the most amusing case is from the *Prairie Farmer;* and I give it in full, because it is instructive as well as amusing. Strange to relate, a one-inch auger hole bored in a man's apple-trees and filled with sulphur failed to kill the cankerworms! Perhaps Mr. Lippincott would like to try next year a two-inch auger upon his trees, or—better still—a tool which is known as a post-axe and is used for cutting large mortises in fence-posts. With such a mortise cut deeply into every tree and filled with a few pounds of sulphur, we should be apt, as folks say out West, "to hear something *drap*"—but whether it would be the Cankerworms or the trees that gave up the ghost, is another affair.

EXPERIENCE WITH THE CANKER WORM.

> Eds. Prairie Farmer:—Some twelve or fourteen years ago, the canker worm commenced in one corner of my orchard, and increased year after year until they got all over the orchard, and would eat the leaves off the trees, until they would be as destitute of leaves in July as in January; and after trying various remedies to destroy them, I finally, with an inch auger, bored a hole nearly through the trunk some three feet from the ground, and put in 1½ ounces of flour of sulphur, and plugged up the hole by driving a piece of pine wood in even with the wood of the tree, which effectually destroyed them the first year, and the trees fruited well that year and have ever since, and that is six years ago; the worms hatched out as before, but died without doing injury. This was done in the spring before the sap commenced rising; I think any time between now and the first of April is the proper time to do it. Although the leaves were so impregnated with the sulphur that the worms could not eat them, yet we were never able to detect it in the fruit.—James Tucker, Warren Co., Ill. (*Prairie Farmer*, March 31, 1866.)

SULPHUR FOR CANKER WORMS A FAILURE.

> Eds. Prairie Farmer:—In your number of March 31st, there is a communication from Mr. James Tucker of Warren county, Ill., giving an account of his experience with canker worms—how he destroyed them with sulphur.
>
> Well, the story was so plausible, straight and simple, that I determined to try it, and did try it. I put twenty-seven pounds of flowered sulphur in and on about one hundred and twenty trees; and the result is, that the foliage of the trees is nearly all eaten up and the fruit nearly all destroyed. It cannot be that this result is from a lack of faith in me, for my faith was so strong that I neglected my usual remedy of getting them off with a pole, and killing them at a stopping place made of tar and smeared on a strip of tin around the trunk of the tree.
>
> Let not Mr. Tucker think that I am censuring him, for I have no doubt but what he thought the sulphur killed the worms.
>
> Lately an old gentleman told me a similar story about sulphur killing the worms in the short space of three days. When I inquired of him what time of year the sulphur was put in, he said, "in wool-carding time." Now it is in wool-carding time that the worms mature and disappear of their own accord, and hence his idea that the sulphur had killed them. I am told of an orchard in this country where they disappeared all of a sudden without any known cause.
>
> * * * *
>
> It seems to me there is not enough said in your paper on this very important subject. Is it possible that the ingenuity of man cannot invent something to prevent a bug from crawling up a tree? The thing must be done; it can be done, and if nobody else will do it I am determined to do it myself.—Wm. P. Lippincott, Vernon, Iowa. (*Prairie Farmer*, June 9, 1866.)

As to the popular belief that sulphur is highly offensive to the larvæ of moths, Dr. Fitch tried the experiment of feeding two parcels of the common caterpillars of the Apple tree, one parcel on clean leaves and the other parcel on leaves copiously dusted over with sulphur. Wonderful to relate, instead of dying, the sulphur-fed caterpillars throve finely and actually outgrew those that had nothing but the natural apple-leaves to feed on. But perhaps, if the Doctor had bored a gimlet-hole in the woodwork of his breeding-cage and filled it with sulphur, the result would have been different. *Quien sabe?* Who knows? The sulphur would be just as likely to rise into the leaves on this plan as on Mr. Tucker's plan. Ask any botanist if it is not so. For the sap can only take up such substances as are soluble in water; and sulphur, as any one can easily prove by trying it, will not dissolve in water.

The Grain Plant-louse.

BY BENJ. D. WALSH, M. A.

It is not at all improbable that the Plant-louse, which infested small grain a few years ago in the Northern States, has now travelled south into Georgia. At all events the wheat in certain sections of Georgia is now attacked by a small insect, which the natives had never seen before; though, as usual, there is no description whatever given of it, further than that it is "small," which may mean half an inch or the hundredth part of an inch long. The *New York Tribune*, from which the following extract from the *Atlanta Intelligencer* is copied, facetiously remarks that "this enemy of the wheat-growers, *judging from the description*, is unlike any of the Northern pests." Where the "description" comes in, I cannot discover. For anything that the Southern newspaper says to the contrary, the new insect may be a beetle, or a four-winged fly, or a two-winged fly, or a small moth, or a bug. But let the article speak for itself; and as the Yankees are good at guessing, they will probably guess what species of insect is referred to by the writer. My guess is "Plant-louse;" but then unfortunately I am no Yankee—only a Western man.

> "A new destroyer of wheat has made its appearance in the wheat fields in the shape of a small insect, which appears on the blade, varying from one to four in number, and which is producing sad havoc. The attention of Mr. Embry was first called to the appearance of the insect and its destructive powers by another old farmer of the same county, Mr. Henry Summerlin. The two together have watched the progress of this insect, and what with the present appearance of the wheat crop in this vicinity, and the destructive powers of the insect itself, have come to the conclusion that great damage will be done to the wheat crop in Carroll County if it be not totally destroyed. The insect, Mr. Embry states, has never before made its appearance in that county."—(*N. Y. Sem. Tribune*, June 15, 1866.)

Popular names for Insects.

BY BENJ. D. WALSH, M. A.

There is nothing more puzzling to an Entomologist than the use of mere names, without any description of form, size, texture or color, in recording the ravages of Noxious Insects. One farmer says that the weevil is taking his wheat in the granary; another says that the weevil is taking his wheat in the field. One would naturally suppose that both were speaking of the same insect; whereas the first refers to what is really a true weevil or snout-beetle, belonging to the same great group as the common "Curculio;" and the second refers to what is not a Weevil at all, nor even a Beetle, but a two-winged fly belonging to the same Order as the Musketoes, House-flies, Horse-flies, &c., namely the Wheat-midge. In some parts of the country, indeed, this last insect is called, by way of distinction, "the Red Weevil," precisely as a miserable bony kind of fish is called a "Red Horse" in the Valley of the Mississippi, to distinguish it from the animals that draw our buggies. But just as often as not this two-winged fly is called purely and simply "the weevil;" which is much as if a Western fisherman were to say that he had got half a hundred "Horses" in his wagon-bed.

If, however, we are puzzled sometimes by the popular names given to insects on this side of the Rocky Mountains, where we are tolerably familiar with the different species that afflict the farmer, how must it be with the Noxious Insects of the Pacific Coast, almost all of which are unknown to science, at least so far as their habits and transformations are concerned? Probably more than one half of the insects of California, &c. belong to species which do not occur in Eastern America. Yet when farmers emigrated thither from the East, they very naturally gave to native Californian insects the same popular names, as they had been in the habit of giving to Eastern species; just as the first English settlers in America called an American species of thrush a "Robin," after the European Robin, which is not a thrush but a warbler. Here, then, we have error heaped upon error and confusion worse confounded.

I have been led into the above remarks from seeing the following article in the *California Farmer* of May 10, 1866:

> ARMY WORM.—We hear that large numbers of the fly which produces the army worm passed through and over the city last Monday afternoon. Vegetation in California presents just now delicious repasts for the hungry, ravenous creatures.—*Sacramento Bee of April 25th.*

Our Eastern Army worm is produced, not by a fly but by a brown moth or miller; and besides, the great bulk of these moths appear, not in the spring (April) but in the summer, varying according to the latitude from June to September. There can be little doubt that the so-called Californian Army-worm is altogether distinct from our Army-worm; just as in the Southern States a moth that infests the Cotton-plant in the larva state (the *Noctua xylina* of Say) is often called the Army-worm, though it is quite different from our Army-worm, (the *Leucania unipuncta* of Haworth.) But what is this Californian species? "Aye, there's the rub." And what are its habits? How does it operate? What plants does it feed on? Is the larva legless, or if it has legs how many has it got? Is the perfect insect a Moth, or a Saw-fly, or a Plant-feeding Beetle, or a Bug? Will not some kind Californian enlighten us all upon these and a host of other such particulars? And above all, will he not send us specimens of the perfect insect, as well as the history of its life? You cannot be too precise or too circumstantial in stating all that you know about it. Points apparently quite trivial in its Natural History may lead the way to some effective method of counterworking it, which may eventually save millions of dollars to your State.

Scientific Names.

BY BENJ. D. WALSH, M. A.

We continually hear people object to what they call the long crack-jaw names, used by Scientific men to designate different species of insects or of birds or of mammals; and much misconception and some ignorance prevails on the subject in the popular mind. It is commonly supposed, for example, that the first discoverer of a new species invents out of his own head two purely arbitrary names for it, the first of which is called the generic name and the second the specific name. In reality this supposition is one half of it almost entirely incorrect, and the other half of it only partially correct. The specific name is indeed fixed by the arbitrary discretion of the first person that *describes* (not the first person that *discovers*) a hitherto undescribed species, but in nine cases out of ten the generic name was established long ago by some other writer, who laid down certain characters in which a certain more or less extensive group of species all agree, which group receives a fixed name from him and is called in scientific language a genus. For instance under the old genus Oak (scientifically *Quercus*) are comprehended many species described by various Botanists, the White Oak, the Black Oak, the Burr Oak, &c.; under the old genus Duck (scientifically *Anas*) are comprehended many species described by various Ornithologists, the

Mallard Duck, the Black Duck &c.; and under the old genus Ladybird (a genus of Beetles called in scientific language *Coccinella*) are comprehended many species described by various Entomologists, the 12-spotted Ladybird, the 9-spotted Ladybird, the 2-dotted Ladybird, &c. To refer a newly-discovered species to its proper genus is often a work of great labor, and it is continually the case that mistakes are made on this point, and the generic name has to be subsequently changed by the same writer or by succeeding writers. But, by scientific etiquette, the specific name always remains the same. The great Linnæus about a hundred years ago described hundreds of our N. A. insects. In every case his specific names are retained in use to the present day; but in very numerous cases his generic names are not retained, because the old Linnæan genera have since his time been very generally split up each into a great number of modern genera. Perhaps in these modern days this propensity has by certain writers been carried to an undue excess; but in the scientific world, as in the moral or in the political world, we are often obliged to accept a state of things not because it is the best possible, but because it is the best that we can obtain short of turning the whole world upside down.

"But," it will be said, "why require all scientific names to be in the Latin language? Why not say 'White oak' instead of 'Quercus alba,' 'Wood Duck' instead of 'Anas (or Aix) sponsa,' and 'Nine-spotted Ladybird' instead of 'Coccinella novemnotata?'" The reason is, that scientific names are intended for the use of Naturalists of all nations, the Russian as well as the Swede, the German as well as the Hollander, the Frenchman as well as the Englishman or the American. Now what could we do in America with a scientific name in the Swedish or in the Russian language? And what could a Swede or a Russian do with one in the English language? Clearly such names would often be unintelligible, and give rise to numerous mistakes and misapprehensions; and if they were translated from the Swedish or Russian into English, or from the English into Swedish or Russian, some writers would translate them one way, some another; which would again give rise to error and confusion. Whereas in the scientific world the Latin is a kind of universal language, understood more or less perfectly by every one; and it was therefore very properly laid down as a universal rule by Linnæus, that all scientific names should be Latin.

"But," it will be again objected, "why select such intolerably long crack-jaw names? Why not, for instance, confine naturalists to words of two syllables and such as are easily pronounced?" The answer is that it is physically impossible to do any such thing. There are now at least a hundred thousand different genera in Animated Nature, including of course both the Vegetable and Animal Kingdoms, each of which has to be designated by a distinct name. How can you ever obtain, by any reasonable combination of consonants and vowels, a hundred thousand different and distinct words all of not more than two syllables? In the richest languages there are only one or two thousand words of one or two syllables each, and all the rest are several syllables long. Frequently, too, even in the popular mouth, long words are used in preference to short ones, and instead of "a school-teacher getting pay for his work," it is "the Professor in an Academy that receives compensation for his services." There are, I believe, somewhere about a thousand distinct ropes in the rigging of a ship, each of which is designated by a distinct name. Yet, instead of all the thousand ropes receiving names of one or two syllables apiece, one rope is called the "Main-topgallant-sail-halyard" another the "Mizen-royal-clewline," &c. &c. Surely the licence which is conceded to the Sailor, with his one thousand ropes, ought not to be grudged to the Naturalist, with his one hundred thousand genera. Nevertheless I freely confess, that some few Naturalists have gone beyond all reasonable bounds, in this matter of coining barbarous and ungrammatical and unpronounceable names, not having the fear of Linnæus before their eyes, who laid it down as a rule, that "Names which are a foot an a half long, or difficult of pronunciation, or offensive to the ear should be avoided.*

"But," some thoughtless reader may suggest, "why give fixed and definite names at all to the different species of animals and plants? Why not let every man, who has got anything to say about a particular animal or plant, explain for himself which species he refers to?" It is precisely this ignorance or neglect of system, which renders the labors of many otherwise good observers utterly valueless. A farmer finds a particular Noxious Insect infesting his crops; he ascertains that by a particular mode of treatment he can subdue it; but as he cannot explain to the world what particular insect he refers to, the world is none the wiser or the richer for his discovery. Whereas if he had been able himself to specify the name of the Noxious Insect, or had been careful enough to send specimens to some reliable Entomologist who might do it for him, his discovery might be put on record for all future time. It is true, he may go to work and draw up what he considers as a description of his Insect Foe; but in ninety-nine cases out of a hundred, as I know by experience, he will dwell upon points of no systematic importance whatever, and omit everything that is essential towards determining the true name of his species. Besides, what a waste of time to describe the same species over and over again! Only think for a moment how such a system would work on shipboard! At present every rope in a ship has its name, and if, for example, the Captain wants the Main topsail lowered for reefing he cries out "Man the main-topsail-halyards." But suppose neither this nor any other rope, sail or mast in a ship had a fixed and definite name, and the Captain had to describe to the Sailors the particular rope he wished them to take hold of, every time he gave an order, in some such language as this:—"Man that rope the use of which is either to hoist up or to lower upon the top the second sail, counting from the deck, on the second mast counting from the stem of the vessel." Perhaps, before he got to the end of his long-winded order, the sail would be blown to flinders or the good ship capsize and go to the bottom.

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*Nomina sesquipedalia, enunciatu difficilia, et nauseabunda, fugienda sunt.

In quoting the scientific name of any plant or animal, an Insect for example, it is usual to give not only the generic and specific names, but the name of the author who first described the species; for instance "*Conotrachelus nenuphar*, Herbst" is the full scientific designation of the common "Curculio." The use of this custom is obvious. If any one is in doubt whether a species which he has before him is the true "Curculio" or not, the scientific designation directs him to turn to the works of the German Entomologist Herbst, and he finds there a reference to the author who first established the genus *Conotrachelus* and a full description of the species called *nenuphar* by Herbst, which he can compare with the specimens in his hands, and see whether or not it agrees exactly, after he has first ascertained that his specimens really belong to the genus called *Conotrachelus* by the French Entomologist Latreille. Some few writers indeed, in quoting the scientific name of a species, add the name, not of the writer who first described the species, but of the writer who first referred it to the right genus. But this plan is practically inconvenient—whatever may be said in behalf of its theoretical justice—and it is to be hoped will never be generally adopted.

Owing to the grammatical peculiarities of the Latin language, the generic name, which is a noun, always precedes the specific name, which is usually an adjective, as is generally the case also in the French language. In English, on the contrary, the adjective precedes the noun and we say "White Oak" instead of the Latin "Quercus alba" (Oak white) or the French "Chêne blanc" (Oak white). But a little practice soon reconciles one to this deviation from the usages of our mother tongue.

In addition to the Species and the Genus, there are other more extensive groups in the Animal Kingdom, namely the Family, the Order, the Class and the Sub-kingdom or Type or Branch, each gradually more extensive and comprehensive than the one which precedes it in the list, besides several subordinate groups such as Tribes, Subfamilies, Suborders, &c., which are used in various senses by various authors. The whole scheme of arrangement may be aptly compared to the organization of a modern army. The Animal Kingdom corresponds to the Army, the Sub-kingdom to an Army Corps, the Class to a Division, the Order to a Brigade, the Family to a Regiment, the Genus to a Company, and the Species to the individual Soldier. Now any military man would laugh outright, if a civilian talked of the 116th Division of Illinois Infantry or the 99th Brigade of Pennsylvania Cavalry. And so do scientific men sometimes smile, when, as is continually the case, scientific charlatans talk of the Family (not Class) of Birds or the Order (not Family) of the Crickets. It is very true that the Scientific Army has been from time to time reorganized and remodeled, so that, so to speak, the number of Divisions, Brigades, &c., is changed from time to time by successive commanders, and sometimes even by the same commander. Still the great fundamental principle of its organization remains always the same; and it is well worth while to become familiar with it, if it were only because it affords a sure earmark to distinguish the pretentious quack from the scientific naturalist.

In one remarkable respect the Scientific is a little more perfect than the Military organization. To designate any particular animal or plant, all that is absolutely necessary is to name the species and genus to which it belongs; while to designate any particular soldier in an Army to whom, for example, we wish to forward a letter, we have to state not only the soldier's name (John Jones) and the company to which he belongs (Company D), but also the particular regiment of which his company forms a part, and probably the particular Army Corps of which that regiment forms a part; whereas in scientific parlance we usually name only the genus and the species. But if the number of genera in the Scientific army continues to increase at the same fearful rate, at which it has been increasing for many years back, it will be impossible for any human memory to retain the names of them all; and it will then become necessary to add the Family or Regimental name to the generic and specific names, so that we may comprehend the more readily where the particular species which is referred to belongs. Some few entomological writers have already adopted this system, writing for instance, *Buprestis* (*chrysobothris*) *femorata* Fabricius, instead of *Chrysobothris femorata* Fabricius, which is the more usual designation of our common western Apple-tree Borer.

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—ASSOCIATE EDITOR.

C. S. Jackson, Ky.—The chestnut-colored beetle covered with very short white hairs and fully a quarter of an inch long, which you say is making great destruction in your vineyards this year, is an undescribed species of *Fidia*. This genus is allied *Pachnephorus*, which contains several described species, and it belongs to the same great *Chrysomela* family as the common striped Cucumber-bug (*Diabrotica vittata*), the blue Flea-beetle of the Grape-vine (*Haltica chalybea*), several species of small Flea-beetles which infest young cabbage and radish-plants and also, as I have observed, young egg-plants, and our newly-imported Potato-bug (*Doryphora* 10-*lineata*), besides two species of Tortoise-beetle which infest the Sweet Potato (*Cassida vittata* and *pallida.*) I have taken your beetle on the wild grape vine in small numbers both in North and South Illinois, but this is the first instance on record of its swarming as it does with you. Its falling from the leaf and feigning death is a habit that it has in common with all the members of the family to which it belongs, and the "Curculio" family do the very same thing.

You say it commences about the middle of June with you, first attacking the upper surface of the leaves by eating holes into it, and if not checked increases with the heat of the season until whole acres of leaves are changed into worthless shreds, or become as full of holes as a sieve. Most probably, as with the Flea-beetle of the Grape-vine, it is in the larva state that it does the principal part of the damage, and as the larvæ of all beetles are altogether unlike the perfect insect, you may not have recognized their identity. The larva of this species will be an elongate grub, with a hard shelly head, a soft body, no wings of course, six legs in front and a single "pro-leg" or short fleshy stump which it uses as a leg at its tail; and the color will probably be some obscure shade of pale drab or brown. It will be found sluggishly feeding on the surface of the leaves along with the perfect insect, and as soon as ever they first appear in the spring you should use every exertion to destroy them. A single female larva destroyed at that time may prevent the generation of a hundred thousand in the course of the summer; for I have little doubt this species is many-brooded, i. e. that there are several generations of them in one year.

The minute insect, which you say "appears about May 1st and clusters in thousands upon the ends of the branches of the grape vine, apparently doing but little damage, though the leaves upon which they are found curl up and cease to act a good part," is a Plant-louse and probably the European species *Aphis vitis.* There are hundreds of cannibal and parasitic insects preying upon plant-lice; otherwise they would soon increase so enormously as to destroy every green thing on this earth. In the small parcel you sent, I counted between two and three dozen specimens of an *Aphidius*—a minute 4-winged Fly belonging to the great *Ichneumon* family, the larva of which lives inside the body of a plant-louse and finally destroys it. Of course they bred from the plant-lice during the eight days they were on the road. As to the Ants, they neither produce nor destroy plant-lice, but simply attend them for the sake of the rich honey-dew, which they cause them to disgorge from the honey-tubes on their back. "The ants," said Linnæus one hundred years ago, "ascend the trees that they may milk their cows, the *aphides.*" If you do not believe Linnæus, you may see the whole operation any day with your own eyes.

T. T. Southwick, N. Y.—The Cherry-twig borers that you sent were five days on the road, and were dead and dried up to nothing by the time I got them. If the twigs had been corked up in a quill or a small glass vial or enclosed in any small tight tin vessel, they would have travelled much better. I know of no insect working on cherry twigs as they do; but until I can see good specimens, I cannot even tell what Order they belong to.

A. D. Chesebro, Mich.—You say you have a cornfield infested with wireworms; that last year you tried ashes and lime as remedies without any perceivable good result; and that this year you put a handful of salt around each hill and about two inches from it, which killed the corn but not the wireworms. As you wish to sow your field with wheat next autumn, I should recommend you to plow it continually through the summer, so as not to allow either weeds or anything else to grow on it. The wireworm lives exclusively on roots, and he is just like one of us Christians in this respect, that he cannot live without eating. But if you allow nothing to grow in your field, there will be no roots for him to feed on; consequently he must necessarily be starved out. In Europe this process is called "Summer fallowing" and is used extensively to destroy weeds and Noxious Insects.

Thos. M'Graw, Wisc.—Your insects arrived in miserable order. Of course if you pack eight glass vials loose in a box, without even wrapping up each in a separate paper, some of them will get broken on the road. Besides, some of your numbers, being marked with pencil on the corks of the vials, I cannot read with any certainty. Here follow the names of your insects, so far as I can name them, many being out of the vials and mashed up with broken glass. No. 1, a kind of Spindle-worm, but not the Eastern *Gortyna zeæ.* No. 2 is the larva of some moth. No. 5, *Arrhenodes septentrionis.* No. 6 is the chrysalis of some moth. No. 8, *Nyctobates pensylvanicus.* No. 10, (in a box) a species of *Iulus*, or hundred-legged worm, not a true insect, but belonging to the Class *Myriapoda.* No. 10, (in vial) *Lytta cinerea*, our common northern potato-bug or blister-beetle. No. 12, *Capsus 4-vittatus*, a true Bug. No. 13, *Megachile brevis*, male, a leaf-cutting bee. No. 14, *Amara basillaris.* No. 15, *Pœcilus lucublandus.* No. 16, *Podabrus modestus.* No. 17, *Lucidota atra.* No. 18, *Nectus tenebrioides.* No. 20, *Sesia diffinis*, but too ragged and torn to name with certainty.—Nos. 14, 15, 16 and 17 are cannibals. Nos. 1, 2, 10 (in vial) and 12 are injurious, and 20 in the larva state eats honeysuckle. Nos. 5, 8, 10 (in box) and 18 feed on rotten wood and are harmless, and No. 13 is also harmless.—I cannot tell what insect you call the "common garden grub." It may be some larva that is very common with you and very rare with me.

L. E. Harmon, N. Y.—The little greenish, flat-oval scales, about ⅛ inch long, attached to oleander leaves are a foreign species of bark-louse often found on greenhouse plants. Their history is nearly the same as that of the common Bark-louse of the Apple tree. When the female gets her full growth she attaches herself to the plant she lives on, and having first laid a number of eggs under her own body, finally loses all traces of organization and dies. In the common Apple-tree Bark-louse these eggs remain unhatched till the following summer, but in this exotic species those laid earliest in the summer hatch the same season, so that the insect is many-brooded. In the specimens you sent I found many of the eggs already hatched into small but very vigorous and active young lice, which had apparently been feeding on the body of their mother, but would no doubt soon go forth on their own hook into the botanical world. With greenhouse plants the best remedy is tobacco-smoke applied in a tight place, washing the leaves afterwards with a syringe; but probably kerosene diluted with about ½ or ¾ water and syringed on to the whole plant would kill them.

C. K. Yant, Ohio.—The flat turtle-shaped beetles, about one-fifth inch long, infesting your sweet potato vines are a common species of tortoise-beetle (*Cassida*), the *pallida* of Herbst. There is another species with five conspicuous black stripes placed lengthways on its back (the *bivittata* of Say) which I found myself in large numbers on the sweet potato in South Illinois. There is still another species (the *atripes* of LeConte, unless my memory fails me) which is a great pest on the common Morning Glory and is called "Gold-bug" by the ladies. This, as well as your species, changes color when alive from clay-yellow to burnished gold, and the golden color is always lost in the dried specimen. The larvæ of all of them have the singular habit of hoisting an umbrella over their bodies composed of their own excrement, for which purpose Nature has given them a long two-forked tail which they have the power of bending over their backs, having first loaded the fork with a suitable forkful. No doubt they find this useful, not only to keep off the sun, but to protect them from birds and cannibal insects.

J. Bird, Penna.—The chestnut-brown shining scales about the size and shape of the half of a pea, adhering to the twig of the grape-vine, are the dead bodies of the Barklouse of the vine—*Lecanium vitis* of Linnæus—an imported insect like the apple-tree Barklouse. Underneath these scales were very numerous white eggs and young lice just hatched out. If abundant on your vines, they will do great injury, unless some kind Ladybird takes to killing them. On the general Subject of Bark-lice, see the Answer to L. E. Harmon in this number of the Practical Entomologist.

O. B. Douglas, Vermont.—I am now able to say, the eggs having hatched out, that the chestnut-brown shining scales, about the size and shape of the half of a pea, which you found on plum-tree twigs are a species of Barklouse. They closely resemble the Barklouse of the Vine but are probably distinct, the eggs being pink now that they are hatching out, although three weeks ago they were pure white. No such species has hitherto, so far as I know, been found on the Plum in this country; but Dr. Fitch describes an allied species, *Lecanium cerasifex*, as found on the wild black cherry.

L. D. Morse, Sec. Missouri State Agr. Soc.—The "eggs very curiously and regularly deposited along the edge of an oak leaf," and between its upper and lower surfaces, are probably those of some Sawfly, many of which inhabit the oak in the larva state and feed on its leaves, like ordinary caterpillars. These larvæ are often mistaken by the inexperienced for caterpillars or the larvæ of moths (*Lepidoptera*), but may usually be distinguished by having a greater number of legs than 16—i. e. 18, 20 or 22. As in the case of the eggs of the *Cicada* (popularly called *Locust*), the eggs of the Saw-fly derive nourishment from the sap and grow thereby; which is the reason why the mother-insect lays them *inside* the leaf and not on its surface. Subscriptions for the Practical Entomologist are receivable by the Secretary at Philadelphia.

R. F., New Jersey.—The heads of wheat you send are infested—not very badly, however—with the orange-colored larvæ of the common Wheat-midge, (*Cecidomyia Tritici*,) an insect which was introduced into this country some twenty or thirty years ago from Europe, and which, according to returns from the different counties of the State of New York, which were thoroughly sifted and footed up by the Secretary of their State Agricultural Society, destroyed in one single year in that single State the enormous amount of *fifteen million dollars' worth of wheat*. In England the largest amount of wheat it was ever known to destroy in one single year was one-twentieth of the entire crop. Such a small percentage as that, American farmers would not think worth talking about; but here the Wheat-midge often takes over half of the entire crop. The reason is simple. In England there are no less than three parasitic insects preying upon the Wheat-midge; in this country there is not one, because it wisely emigrated here without its parasites. One would think that common sense would indicate to our Government the good policy, as a matter of dollars and cents, of importing the parasites, particularly as the whole operation need not cost more than a few thousand dollars. But no. Although this plan was long ago recommended by some of the best entomologists in the country, Dr. Fitch for example, it has never been adopted, and probably never will be. Why? Because our Legislatures think that insects are such very minute objects, that they are unworthy their notice; forgetting that the plague of flies, the plague of lice and the plague of locusts were three of the worst plagues that God in his wrath sent to afflict the rebellious land of Egypt.

The Wheat-midge itself in its perfect or winged form is a small two-winged fly, shaped much like a musketo, but considerably smaller, and with an orange-colored abdomen. It comes out in June from under the ground, where it has lain all winter, the time varying a little according to the latitude, and lays its eggs upon the ears of wheat when they are in blossom. These quickly hatch out into the orange-colored little maggots which do all the mischief, sucking out the life-blood of the future kernel so that it shrinks up to nothing. When full-fed they mostly go underground and construct a very filmy cocoon which adheres strongly to the surrounding earth, and inside which they transform next spring into the pupa state. But a few remain in the ear and construct their cocoon there, which fits so closely to their bodies, that it is only visible where it projects a little at each end, the cocoon itself being transparent and finer and more filmy than the most delicate gold-beaters' skin. I found two such specimens in the few ears you sent. European authors long ago noticed these facts, as to a certain percentage of the larvæ remaining permanently in the ear, but strangely enough they have been overlooked and misunderstood both by Dr. Harris and by Dr. Fitch. The practical inference to be drawn therefrom, is that when farmers are cleaning up wheat, which is infested or suspected of being infested by the Wheat-midge, they ought always to burn up or otherwise destroy the "tailings." For these "tailings" will doubtless contain many of the larvæ that have staid in the ear, which, if not destroyed, might hatch out next season into the perfect fly and propagate the breed. (See on this matter my Paper in the *Proceedings*, &c., IV. pp. 563—9.)

As you say that your "Pedigree wheat," imported from the Isle of Wight for seed, has for two years past been badly infested by this insect, while the rest of your field, which was sown with another kind of wheat, was uninjured by insects, I should recommend you to give up growing "Pedigree wheat." Doubtless this variety is peculiarly agreeable to the mother-fly, so that she gathers upon it from all the other parts of the field to lay her eggs thereon. Possibly, however, it might answer to grow it by way of trap to concentrate all the Wheat-midges upon one spot; but of this you must be the best judge.

M. H. Boye, Penna.—The ears of wheat and rye that you send are infested by the larva of the common Wheat-midge, which is often popularly called the Red Weevil. You will find the information you want in the answer to "R. F., New Jersey" in this number of the PRACTICAL ENTOMOLOGIST. I found two specimens of the larvæ in your rye that had already made their cocoons, just as I did in the wheat sent by R. F. This is a curious fact, because both Harris and Fitch ignored the possibility of any larvæ passing to the pupa state in the ear and coming out as winged flies the same season. Yet, from these two examples, it seems to be comparatively a common thing. The same insect attacks indifferently both wheat and rye. Farmers should always be careful to burn their "tailings," when they clean up small grain known or suspected to be attacked by the Wheat-midge; because they will thus destroy many of the larvæ that are now proved to stay in the ear, instead of going under ground as most of them do. I think it not at all improbable that many of these larvæ that stay in the ear will not come out into the fly state till the following June, though the fact is not noticed by English writers, who were well aware that a certain percentage of the larvæ staid in the ear. I infer this from the analogy of other species of the same genus.

J. H. Foster, Jr., Penna.—The elongate-conical, brown bodies about one-fourth inch long, growing from the leaf of the Isabella grape-vine like so many thorns on a thorn-bush, are galls made by some species of *Cecidomyia* or Gall-gnat. I know two other kinds of galls made by gall-gnats on the grape-vine, which are quite distinct from these of yours. The larvæ of all Gall-gnats are readily distinguishable by what is technically called the "breast-bone," which is a dark-colored horny process, generally Y-shaped or clove-shaped, which is situated on the lower part of the first joint behind the head, and the use of which I believe to be to abrade the internal surface of the gall so as to cause an unnatural flow of sap to the part, upon which sap the larva lives. Most of these larvæ are blood-colored, orange-colored or yellow, with peculiar bowel-like, curdy, white markings; but a few are entirely pale semi-transparent whitish. The number of different galls made by Gall-gnats on different plants is enormous, but the perfect fly has been bred from but very few of them, as they are peculiarly hard to rear to maturity. For example, Baron Osten Sacken describes eight different gall made by Gall-gnats on the leaves of different kinds of Hickory, but he only bred the perfect fly from a single one of the eight.

Marion Hobart, Illinois.—The oval bunch of eggs about three-fourth inch long, surrounding a twig of the cherry tree and shining with a certain glutinous substance which protects them from the weather, is nothing but the eggs of the common web-caterpillar of the Apple-tree, *Clisiocampa americana*. This larva commonly feeds not only on the apple-tree, but on cherries and plums both wild and tame, and also on the birch, the willow, &c., and on all which trees the eggs are commonly found. It is remarkable that these eggs should stand all the heat of the summer's sun and all the cold of the winter's winds, without losing their vitality. But there they swing aloft, blown to and fro by every breeze, scorched by the heat and parched by the cold, till the earliest spring leaves put forth, when out of every egg that has not been preyed upon by a minute parasitic *Platygaster* issues forth a tiny worm, to gorge itself with leaves and grow and grow, till it finally becomes a pale reddish brown winged moth. There is another web-caterpillar—*Hyphantria textor*, Harris—which I find sometimes on the apple tree and other trees, but much more commonly on the Pignut Hickory—which produces a white, not a pale reddish brown, moth. This, however, may be readily distinguished from the other by its wanting the beautiful sky-blue stripes and being much smaller and appearing much later in the season.

M. S. Hill, Ohio.—The clay-colored beetle nearly an inch long and with six black spots on its back is *Pelidnota punctata*, a well known enemy to the foliage of the grape-vine in its perfect state, though its larva to my knowledge feeds on very rotten wood. The smaller beetle not quite one-half inch long and varying in color from almost entirely clay-yellow to almost entirely black is *Anomala lucicola*, and is likewise well known to attack the leaves of the grape-vine. Its larva probably feeds underground on the roots of plants. Both are figured in Harris's book.

The caterpillar you sent which infested the raspberry bushes, "feeding with great voracity upon both the leaves and the berries," spun its cocoon on the road, and I can therefore say nothing about it. I hope to breed the perfect moth from it, when I will advise you further. The insects were all well packed and reached me in first rate order.

Rev. Jas. B. Fisher, N. Y.—You send about a dozen blackish maggots, ⅓ inch long and with the head end tapered to a point, which you say were found attached by their mouths to the body of a half-fledged young swallow, most of them to the head of the bird, much as a tick is attached to the body of a sheep, but not so firmly but what you could pull them off. They arrived in excellent order and form now a very interesting and valuable addition to my collection.

I have carefully examined these larvæ and they belong, I think, undoubtedly to the *Œstrus* family—a family of two-winged flies which includes the fly that produces the Head-maggot of the sheep—the fly which makes what are called "wormals" (worm-holes) in the hides of Cattle—another fly as large as a large Humble-bee and very like one, which lays two or three eggs on the neck of the rabbit, whence proceed maggots nearly as large as a man's thumb burrowing in the flesh and causing a large tumor on the affected part, from which maggots I have myself bred the perfect fly (*Cuterebra cuniculi*)—another fly nearly as large, (the *Cuterebra emasculator* of Fitch) which lays its eggs in the scrotum of squirrels, so that the larva hatching out therefrom finally mutilates them and produces the phenomenon of emasculation in a state of nature, which imaginative hunters had accounted for by supposing that the old male squirrels mutilated the young ones—and finally the well-known Bot-fly of the Horse. Nay, even the sacred body of man is not free from the attacks of these insects; for there is authentic evidence that a species exists in South America which makes "wormals" in the human flesh. But in all these cases, and also in the case of all other known insects belonging to the *Œstrus* family, the larva resides somewhere inside the body of the infested animal and that animal is always a mammal, or properly speaking a Quadruped; whereas in the remarkable case recorded by you the larva is attached externally to the body of the infested animal, and that animal is, not a mammal, but a bird.

All larvæ belonging to this family, as soon as they are full-fed, extricate themselves from the animal they infest and go underground to pass into the pupa state, not emerging into the perfect fly state till the following season. It would be very desirable, in case you meet with another swallow infested by these larvæ, to attempt to breed the perfect fly from them. For this purpose the bird should be placed in a large jar half full of moist earth and kept alive by feeding it with flies. After the parasites have retired underground, the earth in the jar should be kept moist by covering it with damp moss or damp dead leaves, moistened afresh every few weeks; and in the following spring the mouth of the jar should be covered with musketo-bar to prevent the flies escaping uncaught. Most probably these flies will belong to a new and hitherto undescribed genus, which, if you should succeed in rearing them, will be very appropriately named "Fisheria." If you send some to me, I think I can promise you that much.

You observe upon the strangeness of so large a parasite infesting so small an animal. There is a small wingless parasite, about the size of the head of an ordinary pin, which infests many kinds of beetles, especially dung-beetles, and of which I once counted no less than seven all gathered upon the body of a single small fungus-beetle, not much over ⅛ inch long—the *Triplax thoracica* of Say. This is as if a grown man had seven lice crawling over his person, each louse as large as a full-grown turkey.

James Barratt, Mass.—The oval, pale brown, smooth, silken cocoons, about one-fourth inch long, which you send, were spun by the larvæ or worms, which, as you say, were found by thousands upon two American Black Spruce trees, eating all the leaves off them. They will produce four-winged Flies belonging to the Family of Saw-flies (*Tenthredinidæ*), so called from the females having a pair of saws at the tip of her abdomen, which she uses to cut slits in the leaves wherein to deposit her eggs. Most probably your species is the *Lophyrus abietis* of Harris, which has long been known to operate upon fir-trees in Massachusetts in the manner you describe. The male fly is black and the female pale brown, so that you would scarcely think they belonged to the same species. You will find figures of each in Harris's book on Injurious Insects, Plate viii, figs. 3 and 5. The best way to get rid of them is to shake the larvæ or worms off the tree upon a sheet, and then either burn or scald them or feed them out to chickens, turkeys or hogs. Of course if they are allowed to increase and multiply without check either from man or from some cannibal or parasitic insect, they will destroy the trees upon which they feed.

And now, Mr. Barratt, let me give you a scolding. You sent indeed great plenty of cocoons, and for that I thank you; but you sent them loose in your letter, so that almost all of them were squeezed as flat as a pancake before they reached me. Now in this region we have no *Lophyrus*, because we have scarcely any pines and firs; and I therefore should have been glad to rear specimens of the perfect fly from your cocoons, which now I shall probably be unable to do. Another time always enclose specimens in a little pasteboard box, filling up any vacant space with cotton-wool or some such matter.

Arthur O. Brickman, Maryland.—It is quite impossible to tell what insect it was that stung you. The symptoms in your case were certainly very severe and unusual, but I believe that this was owing to some peculiarities in your habit of body at the time, rather than to any peculiarity in the nature of the insect—if it was an insect and not a spider—that stung you. The sting of a honey-bee is ordinarily not very severe in its effects; but I know of cases where persons stung by honey-bees have died in consequence. When I was a boy I was often stung by bees and humble-bees without suffering much therefrom; but on one particular occasion, being stung in the lip by a humble-bee, my whole body was in five minutes covered by lumps like a violent nettle-rash, and in an hour's time my face swelled up so that I could not see out of my eyes. I recollect well that this attack lasted for three days and was finally subdued—after trying various other remedies—by poultices of an English herb called "feverfew." I am generally stung now two or three times every year, as I catch many stinging insects fearlessly with my bare fingers; but I always find, that if I suck the wounded part for ten or fifteen minutes, the consequences pass off in a short time.

Geo. E. Brackett, Maine.—The shining mahogany-colored bunches, of an irregularly hemispherical shape and about one-fourth inch in diameter, attached in masses to blackberry stems and each of them when lifted up disclosing an enormous number of minute pale pinkish eggs, are the dead bodies of a bark-louse. A species which cannot be distinguished from this, so far as the dead body of the mother bark-louse is concerned, infests the grape-vine, and was named by Dr. Fitch *Lecanium vitis* and supposed to be identical with a species that infests the grape-vine in Europe. I also received from O. B. Douglas of Vermont exactly similar specimens found on the plum, as noticed in the "Answers" in No. 9, p. 89. I had thought at first that the species found on the plum might be distinguished from that found on the grape-vine by the color of the eggs; but it seems probable that the immature eggs are always white, and that as they approach the time when the included young bark-louse is almost ready for hatching, its pinkish or reddish color shows through the delicate shell of the egg. Still it is not improbable, that when the males of all these bark-lice are bred, they may prove to be distinct species. This has not yet been done with any of our N. A. *Lecanium*. Great numbers of your eggs hatched out on the road, and there were also in the box two minute Chalcidians, which had no doubt been parasitic in one of the eggs, remarkable for having a bright yellow scutel. I know but one other Chalcidian that has such a yellow scutel.

Dr. Wm. Manlius Smith, N. Y.—The "elongated eggs" you find in the pith of dead sumach twigs I know to be those of some species of the Catydid family, probably belonging to the genus *Orchelimum* or *Xiphidium*. See on this matter my Papers in the *Proceedings* III, pp. 232—3 and 581. There was no living thing in the specimens sent except these eggs.

The *Practical Entomologist*, now near the close of its first year of publication, desires to know if its friends will sustain it another year to the extent of 5000 subscribers at 50 cents each. It ought to have 500,000, even at a dollar. There is not a farmer in the United States who could not derive great benefit from reading it. Some single hint on the destruction of some troublesome insect might save the subscriber many times the cost of the paper.—*Weekly New Hampshire Advertiser.*

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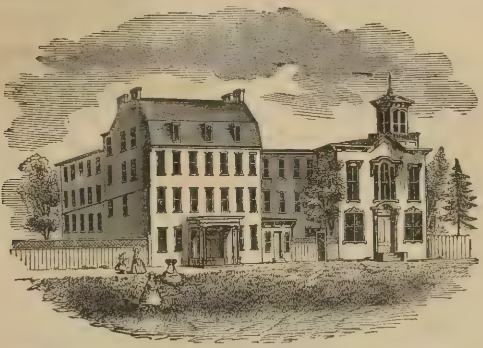

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BENJ. D. WALSH, Rock Island, Illinois,
ASSOCIATE EDITOR.

PHILADELPHIA, AUGUST 27, 1866.

We have received communications from several of our friends—who are kindly endeavoring to get up clubs of subscribers for the second year of our paper—asking permission to collect and send the subscription money *now*. Although we are yet uncertain whether we shall succeed in obtaining the desired number of subscribers, we shall be willing to receive the money now *from those getting up clubs*, and we promise, that if the paper is not continued the money shall be promptly returned. Those who subscribe for from one to five copies, will please not send the money until the question of publication is decided, which we hope to be able to announce, one way or the other, in our next number. At the present time we can only say that the prospect looks bright, by reason of the rapid way in which renewals are coming in, and if they continue so to do, we shall, no doubt, be able to raise the required number by the next issue. Our friends have so far done nobly, but there are many of the most strenuous advocates of the enterprize yet to be heard from; we hope that they will also do their best to send us subscribers.

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The "New Potato Bug" in Maine.

One day last week a gentleman left at our office a stalk from a potato hill, which was literally covered with the larva of the new potato beetle (*Doryphora* 10-*lineata*, Say.) We were absent from the office at the time, and the employee with whom it was left neglected to take his name or place of residence, or obtain any facts in relation to their numbers and amount of damage. If this should meet the eye of the party who left it, will he be so kind as to favor us with the requisite particulars? Returning home, we found upon examination that our own patch of potatoes was considerably infested with them, and immediately commenced a war of extermination by knocking them off into an old pan and destroying them. Specimens have also been sent to Mr. Cresson, the Secretary of the Entomological Society of Philadelphia.—*Maine Farmer*, July 26, 1866.

OBSERVATIONS BY B. D. W.—I take it that the Editor has mistaken the larva of *Lema trilineata*, a beetle which commonly infests the Potato in New England though it is very rare in Illinois, for that of *Doryphora* 10-*lineata*. It is strange, however, that he should say nothing of the excrement which this larva heaps upon its own back by way of umbrella. We have not as yet received the promised specimens.

Outlines of the Study of Insects.—III.

Having shewn how the Class of Insects may be known from the Classes of Crustacea and Worms, it remains for us to treat of the sub-divisions of the Insects. Of these there are three grand groups or Orders; namely, the Centipedes and "Thousand-legs" or *Myriapoda;* the Spiders, Scorpions and Mites, or *Arachnida*, and the true six-legged Insects. The Myriapoda are the lowest order by reason of their worm-like form. Each ring or segment repeats the form of that next to it, is provided with a pair of legs, from the head to the opposite end of the body, and the distinctions between the head, thorax and abdomen are so slight as to be easily passed over. But in the young, the body is more insect-like, there is a distinct head, and the three pairs of legs attached to the thoracic region, together with the absence of abdominal legs, all show that the adult Centipede is essentially an *insect*, and does not belong to an independent class, as taught in most of the text books.

The Myriapods, with some Spiders, also differ from all others of the Class, in that the yolk is not enclosed within the body walls until sometime after the larva is hatched. The Myriapods are, in some genera—such as the Centipede—provided with poison sacs at the base of their powerful jaws, which render them a terror to man. They are not provided with compound eyes, and only have simple eyelets, thus agreeing with the Spiders in this respect. The young larva attains its growth by the addition of rings, often more than 100 in number, which grow out from just in front of the second ring from the end of the abdomen.

The Myriapods are divided into two suborders; i. e. those genera, such as the Centipedes, which are provided with flat bodies and have few rings, and consequently a less number of legs than the "Thousand-legs," or *Julus*, comprising the higher suborder; while the latter, whose bodies are cylindrical and many jointed, with very numerous legs, form the second and lower suborder.

The second and next higher order of *Insecta*, are the *Arachnida* or Spiders, Scorpions and Mites. While the three regions of the body are here present, the head is so merged in the thorax as to resemble strikingly the Crab, with its head-thorax and abdomen, and in the larger number of species, the abdomen is of great size when compared with the head and thorax, as seen in the common House Spider. But when we study the development of the Spider, we find that at first the embryo is worm-like, and that many species of mites are at first six-legged, though the adults are invariably provided with eight legs, and that the head is at first very distinct from the thorax. Thus the Spiders and Myriapods first start as worms, then become like the true insects in form, but when full grown, by a retrograde process of growth, lose their essential insect form and assume shapes which remind us of the much lower Worms and Crustacea.

The Spiders have no antennæ, and generally 4 pairs of simple eyes; their bite is poisonous to insects and other animals on which they prey, but rarely to man.

After leaving the egg, Spiders grow by successive moultings, or changes of skin, not passing through, as a rule, successive metamorphoses like the insects, though the lowest Arachnida, such as the parasitic mites, do undergo a distinct metamorphosis.

The Arachnida possess four pairs of thoracic feet; and the three pairs of spinnerets at the extremity of the abdomen are but modified limbs. The silk glands, situated in the abdomen, are also six in number, and in Epeira, the common Garden Spider, which has a very large abdomen and spins large webs, they occupy one-fourth of the abdominal cavity. Each gland terminates by means of a slender tube in one of the six spinnerets. The males are generally very different from the females, differing in this respect from the hexapodous, or six-legged Insects.

Spiders breathe by means of tracheæ and also by gills, or so-called Pulmonary Sacs. The *Pulmonaria*, or true Spiders and Scorpions, are provided with from six to twelve ocelli, and breathe by ærial gills; while the *Trachearia*, or Mites, including the False Scorpions, such as Chelifer, a minute scorpion-like mite found in dusty places; and the Harvest Men, often called Daddy-long-legs, found in damp shady places, breathe by tracheæ. The mites are usually parasitic on other animals, including man. *Ixodes*, the wood-tick, lives in forests, and attaches itself to passing animals. It is found in warm climates. Some low Mites which live as parasites on other, mostly aquatic, animals, are so low and degraded, from being stationary, in their habits, and little short of mere machines for sucking the juices of their victims; as to be scarcely distinguishable from low Crustacea of similar habits. Thus two great divisions of articulates, really so different in the essential plan of their structure, by a similar mode of life assume nearly identical forms, just as the warm blooded whale which sucks its young, assumes the form of the cold blooded fish.

We have seen that in the true six-legged, flying insects, each of the three regions of the body has become more specialized than in the Myriapods or Spiders. The head is freer from the body, and nearly equals in size the thorax.

The head of insects, though generally supposed to be composed of but a single ring, equivalent to one of the thoracic or abdominal segments, is in reality probably composed of seven such rings, of which four are grouped in front of the mouth-opening, and three behind. The four rings in front, bear the organs of sight and sensation, such as the ocelli or simple eyes, of which there are probably two pairs, and the compound eyes, and the antennæ, while the three rings behind the mouth bear the palpi, and two pairs of jaws, which are for digestive purposes, i. e. seizing and preparing the food for digestion in the stomach.

There are both simple and compound eyes, the latter composed of thousands of facets which are of a hexagonal shape, arranged in a half globe, so that the insect can see on all sides, both before and behind.

The antennæ are organs which seem to unite the functions of touch, hearing and taste, though it is probable that the palpi are tasting organs. The fore pair of jaws (*maxillæ*) are tasting and masticating organs, and serve to select the food, partially tear it, and then transfer it to be more thoroughly reduced to pulp by the mandibles. The jaws (*mandibles*) are situated nearest to the base of the head, and in natural succession are placed next in front of the fore pair of legs.

It should be noticed that no single ring is fully developed in the head, and that the parts are aborted the farther it is situated from the thorax. This is so marked that the foremost ring bearing the ocelli are reduced to a mere point, serving as a socket for the eye-speck. Thus it is by the diminution in size, or entire absence of useless parts, and the presence and increased size of the more important parts of the ring which are to support these organs, during growth, that the head is shaped and acquires its finished form in the adult.

Most writers have defined insects as differing from all others of their type in being winged. But there are numerous exceptions to this general rule. Such are the Flea, Louse, Bed Bug, Plant-lice and some grasshoppers, and other insects whose females live in cases, while the males are winged. These wings are generally four in number, one pair of which is situated on the middle and the second pair on the hind ring of the thorax, though in flies there is but a single pair on the middle segment. At first the wings are fleshy pods which bud out just above the insertion of the legs, and also above the row of breathing pores (spiracles), permeated thickly by veins and accompanying air-tubes. On being placed under the microscope, the blood may be seen flowing slowly in towards the body, the veins enclosing the minute air-tubes. There are six main branches, or *nervures*, which subdivide in the middle portion of the wing into four or five branchlets or *nervules*. In the bee, beetle, fly and butterfly these form a stiff frame-work over which the membrane or skin, is stretched, thus combining strength and lightness, and by folding on themselves like a fan, enables the wing to be folded compactly upon the back.

In our next article we shall learn how insects breathe, digest their food and reproduce their kind; and speak of their metamorphoses and their instincts.

A. S. P.

[FROM THE DISCUSSION AT A MEETING OF THE FRUIT-GROWERS' SOCIETY OF WESTERN NEW YORK.]

The Army Worm—its dangers and remedy.

Mr. Sharp, of Lockport, said this worm had been very destructive in some portions of Niagara county; was so last year, and is this also. They proceed in veins and seem to be working southerly. Mr. Bronson—They have been very troublesome in the vicinity of Geneva. Hellebore, tobacco and various other alleged remedies have been tried in vain. He had employed sixty men in his nursery, armed with a species of cleaver with which the worms were severed as fast as found. Kerosene would finish them and the trees too. Crude petroleum as a wash might do, as it has proved effectual in the case of insects on rose bushes, and also slugs in the garden. Mixed with water it will not kill plants. Mr. Ferris—Soft soap will kill them, but the cheaper and safer way is to get a pair of leather mittens and crush the vermin. Mr. Smith—A few years since the region of Syracuse was visited by the worms in question, and they were got rid of by using a mixture of sulphur and lard plastered around the body of the tree. The coating should be several inches wide and be put on pretty liberally. The worms will not pass this barrier, but will accumulate below it—much as bees do in swarming—when they are easily despatched. If any worms have already ascended the trees, they may be got rid of by shaking or jarring the limbs, when the worms will spin down by a thread to the ground. They will make for the tree again, but the barrier of sulphur and lard will stop them.—*Western Rural*, July 21, 1866.

OBSERVATIONS BY B. D. WALSH.—The insect here spoken of is evidently not the Army-worm, which never climbs trees but feeds on tame grass, wheat, oats, &c. Most probably it is the Canker-worm that is referred to, which is a 10-legged Span-worm, whereas the Army-worm has its full complement of legs—16. This is only another illustration of the promiscuous way in which popular names are used, or rather abused. But even scientific names sometimes fare no better; for I notice that our western vintners still persist in calling a certain insect that afflicts their grape-vines the "Thrips," though it is most probably nothing but the old-fashioned flea-beetle—*Haltica chalybea*—and certainly cannot be a true *Thrips*. Why don't they send us specimens and get its true name ascertained? What is the use of calling a cow's tail a leg? A cow's tail will be a cow's tail still, though every farmer in the West should persist in calling it a leg every day of his life from A. D. 1866 to A. D. 1900.

[FROM A LETTER FROM M. S. HILL, EAST LIVERPOOL, OHIO.]

The Potato-bugs, *Lytta atrata* and *Lytta vittata*, have appeared in countless numbers about seven miles north of this place, to the great injury of the potato crops and to the great disgust of the farmers. Many are the expedients that have been resorted to, to rid the fields of the nuisance. I understand that the most successful method of destroying them was by placing, between the furrows or rows, dry hay or straw, and setting it on fire. The bugs were thus nearly all destroyed, and the straw burning very quickly did not injure the vines. Might not this remedy be applied with success in the destruction of your *new* and *highly improved* Western Potato-bug?

REMARKS BY B. D. W.—The "fire cure" for the Potato-bugs is quite a new idea to me; and in the case of these old-fashioned Potato-bugs it may likely enough answer a very good purpose, provided care be taken not to make too fierce a fire. The known efficiency of hot water in killing the Onion-maggot and the larva of the Peach-borer, without injuring the plants which those insects infest, proves that certain growing plants can stand, without any ill consequences, an amount of heat which is destructive to insect life. In the case of the new-fashioned Potato-bugs, however, the process would have to be repeated several times; for in this species there is more than one brood every year, and after a potato-patch has been thoroughly cleansed by hand, the very next day there will be a fresh swarm on it that has flown in from other quarters. I watched one of my neighbors, who had planted a town-lot with potatoes, turn in with his whole family and pick the bugs off every evening for about a month, till finally he became discouraged and gave up the job. Consequently the whole patch, like many others in my neighborhood, is nothing now but a mass of dead dry blackened stumps; and of course he will not even get his seed back.

A New Humbug.

BY BENJ. D. WALSH, M. A.

Suppose I were to come before the Agricultural community with some such proposal as the following:—

GREAT DISCOVERY IN BREEDING HORSES!!!

I claim to have discovered an unfailing method of rearing every year, at a trifling expense, some ten or fifteen good strong and healthy colts, worth $500 apiece, from any mare, however old and worthless she may be. After a series of experiments running through four or five years, I have discovered that every brood-mare, during the months of September and October, lays ten or fifteen large yellow eggs, about the size, shape and color of a pumpkin, always straying away from home to lay, as the guinea-hens do; and that, in order that the eggs may not be addled, it is necessary to allow her to sit upon them for a certain number of hours every day, and it is further necessary to take certain other precautions, which for the present I choose to keep secret. As an evidence of the truth of my assertion, I demand that a committee of the most eminent stock-raisers be forthwith formed, and that they proceed to satisfy themselves, by searching diligently in their fields, whether these large round yellow mare's eggs are not often to be met with, especially in corn-fields. I propose to offer the right of using my new Patent Method of hatching out Mare's Eggs to each County for $100—a liberal discount allowed to several counties clubbing together. As there are thirty-six States in the Union, averaging perhaps about one hundred counties apiece, to say nothing of poor vetoed Colorado, this will only put $360,000 into my private pockets; which I consider to be but a very moderate recompense for the trouble and expense I have been at, in making this most astonishing and invaluable discovery.

What would the Farmers say to such a proposal as this? Well, they would laugh me to scorn. Why? Because they know all about mares and colts, and they are well satisfied that mares do not lay eggs. But when a plan to get rid of the Hessian Fly, which is just as absurd and just as irrational as my imaginary plan for hatching out Mare's Eggs, is paraded before them by a man who is either a fool or a knave, or a beautiful compound of these two characters, the Agricultural Papers endorse the humbug, and many a Farmer will, no doubt, swallow the gilded hook Why? Because, although Farmers understand well the Natural History of the Horse, not one of them out of a hundred knows anything of the Natural History of the Hessian Fly. But to the point. The following appears in the *Maryland Farmer* for July, 1866. I will first furnish the bane, and then do what little lies in my power towards administering an antidote. But in spite of all I can say, I know full well that Mr. Newcomer will find plenty of disciples and followers. When a farmer wants crackers, he goes to a baker for them; when he wishes for a new coat, he goes to a tailor; and if he lacks a new pair of boots, he usually calls on the shoemaker. But, somehow or other, most farmers have a lurking idea in their heads, that the place to go to for information about the Natural History of Noxious Insects is, not to those who have made such matters the study of their lives, but to the first impudent mountebank that comes along with a precious story about a Cock and a Bull.

GREAT DISCOVERY IN DESTROYING THE HESSIAN FLY.

We would call the particular attention of farmers, especially wheat growers, to the following brief communication from Joseph W. Newcomer, formerly of Washington Co., Md., who claims to have discovered an unfailing remedy for the Hessian Fly in wheat. He has accomplished this after a series of experiments running through four or five years, and it has never failed him. If he has succeeded, as he believes he has, he will have rendered himself indeed a great benefactor. He claims that the fly is formed in the new wheat, and it must be destroyed before it is seeded—and as an evidence of the truth of his assertion, he calls upon growers of wheat to thoroughly examine the present wheat crop to convince themselves of this theory. He proposes to offer the right of using his method of preventing the Fly, to each county, for $100.—We would suggest that some of our experienced wheat-growers would examine into the subject, and report the results of their investigation. Considering the matter of so much importance, we have introduced it in our editorial instead of our advertising columns.

"The Hessian fly first forms its eggs in the new wheat—if the farmer will take the trouble to examine his present crop, he will find the nitt laid in the curve of the grain—it is deposited there by a small black fly. The farmer sows the wheat with the insect deposited, and if the fall season should be dry the fly makes its appearance. When they come out early in the spring, if the season should be dry, they deposit their eggs in the first joint. The spring hatching does the injury. If the season should be dry the insect cuts through the stock, which generally makes its appearance about the 10th or 15th of June. I have been several years in making the discovery how to destroy the fly, and I now claim to do it without fail."

All communications addressed to Mr. Newcomer can be directed to the care of this office.

Now let me point out a few of the mistakes and absurdities in the above, which the Editor, "considering the matter of so much importance," has published in his editorial columns—whether gratuitously or not he does not inform us.

1st. The Hessian Fly does not, as Mr. Newcomer asserts, ever under any circumstances deposit its egg upon the grain in the ear of the wheat. There are two broods of this fly every year. The first brood comes out about the first of May in the latitude of New York, or a little earlier or later as you go south or north, and lays its eggs upon the upper surface of the leaf of the wheat, close to the part of the straw which is tightly enwrapped by the base of the leaf, generally about the 2nd joint in the straw from the ground. From this spot the little maggots produced from the eggs crawl downwards into the space between the straw and the base of the leaf, and remain there, sucking out the sap of the plant, till they are full-grown and ready to pass into the pupa state. They then construct a shining semi-transparent mahogany-brown cocoon, inside which they lie a long time in the larva or maggot state, but finally assume the pupa state. The above is what is ordinarily known as "the flaxseed state," from the cocoon being flattish and somewhat pointed at each end, so as to resemble a flaxseed. About ten or twelve days afterwards they burst through the cocoon, and come out in the shape of a small blackish fly, with some orange bands on its abdomen, and shaped like a Musketo but much smaller; when the male and female couple as usual, and the female lays her eggs for the second brood. By this time, in the latitude of New York, it is usually the beginning of September or thereabouts, the period varying a little according to the season and the latitude; and there is now no wheat standing uncut in the fields, for the mother-fly to lay her eggs upon the ear, if she was so minded. But she is not so minded. Nature tells her to deposit her eggs, as before, on the leaves of the new crop of growing wheat or growing rye; but this time she lays them almost or quite underground, as if she had been aware that winter was coming and her future family would require protection from the weather. The larvæ produced from these eggs crawl downwards as before, pass through the same circle of changes as before, and come out in the spring, in the same Musketo-like form in which the other brood had come out in the preceding autumn, to generate the 1st brood of the current year, as already explained.

2nd. The only proof offered by Mr. Newcomer of his new theory is, that a "nitt" or egg is to be met with "in the curve of the grain," by which I suppose he means the groove found on one side of the kernel. No such "nitt" is to be met with. But suppose there is. How does that prove that the "nitt" is the egg of a Hessian Fly? The grain is harvested in June or July. The 1st brood of the Hessian Fly comes out about May 1st and is too early for the ripe grain. The 2nd brood comes out, at the very earliest, the last week or so in August, and is too late for the ripe grain. Consequently, even if eggs existed on the ripe grain, they could not be the eggs of the Hessian Fly A certain D. H. Sherman in Illinois recently fancied, that he had found eggs in the "fuzzy" or blossom end of the kernels of wheat; and forthwith jumped to the conclusion that these must be the eggs of the Chinch-bug, and that by pickling the seed-wheat the Chinch-bug could be annihilated. It has been well shown in the columns of the Practical Entomologist by Mr. C. V. Riley, (No. 6, pp. 47—8,) that no such eggs existed, and that the Chinch-bug laid its eggs elsewhere; but Mr. Sherman had at least the advantage over his Maryland compeer of not asserting impossibilities. He never pretended, as Mr. Newcomer does, that an insect, which exists, in the winged state, only in the spring and the autumn, laid its eggs upon the ripe wheat kernels in the middle of the summer.

3rd. Mr. Newcomer says that "if the season should be dry, the insect cuts through the stock [stalk?], which [insect?] generally makes its appearance about the 10th or 15th of June." It is physically impossible that the Hessian Fly should cut through anything, because it has got no jaws to cut with. In fact it always works its way out to the light of day between the straw and the leaf, while it is still in the pupa state, without cutting any hole at all; and then bursts its pupal envelop and comes out as a winged fly. But there is a small black parasitic *Chalcis* fly, (the *destructor* of Say) which I bred myself in South Illinois from straw infested by Hessian flies, and which really does cut a round hole to make its way out by, and comes out in June and July, instead of early in May, like the Hessian Fly. Evidently Mr. Newcomer has mistaken this parasite for the Hessian Fly—and confounded his best friend with his bitterest enemy. But what does that matter, if he can coax every county in the United States into paying him $100 for his blunders?

Perhaps, in what has been said above, I have spoken with undue harshness of Mr. Newcomer and his pretended discovery. Perhaps he is a very worthy man and a very excellent entomologist, and is by no means desirous of lining his own private and peculiar pockets with a goodly amount of greenbacks from the humbugged and victimized farmers of the United States. Perhaps, instead of the *Chalcis* fly being parasitic on the Hessian Fly, as we poor ignorant old-fashioned Entomologists had hitherto all of us believed, it is in reality the Hessian Fly that is parasitic upon the *Chalcis* fly. Perhaps this *Chalcis* fly, coming out in June and July, does really lay its eggs, as Mr. Newcomer asserts, in the lateral groove of the ripe kernel of wheat while the crop stands in the field. Perhaps the Chinch-bug, as Mr. Sherman asserts, does really lay its eggs upon the *fuzzy* end of the same ripe kernel of wheat. Perhaps—to make the whole thing complete—the Wheat Midge lays its eggs upon the *smooth* end of the same fully ripe kernel of wheat. Perhaps, therefore, with one fell swoop, we can annihilate those three worst enemies of the wheat-grower—the Hessian Fly, the Chinch-bug, and the Wheat Midge—by the application to our seed-wheat of the same Universal and Infallible Pickle, patented by Messrs. Newcomer, Sherman & Co. Perhaps brood-mares do really lay eggs and sit upon them till they hatch out. *Quien sabe?* Who knows? Perhaps Messrs. Newcomer and Sherman know more about the habits of the Hessian Fly and the Chinch-bug, than Dr. Harris and Dr. Fitch and Mr. Herrick and Dr. Le Baron and Thomas Say and Baron Köllar and Dr. Chapman and Mr. Havens and Mr. Tilghman and that miserable Illinois scalawag, Benj. D. Walsh. Perhaps we ought implicitly to believe all that these two learned persons tell us, and distrust the evidence of all the others, who, as they know a great deal about other insects, may be reasonably inferred to know nothing at all about the Hessian Fly and the Chinch-bug; on the principle that, when a bottle is choak-full, you cannot anyhow pour any more whiskey into it. Perhaps, when one has a lawsuit on hand, instead of applying to one of those rascally "high-faluting" lawyers, who are always using crack-jaw words that nobody else can understand, it is wise and prudent to entrust one's case to the first good honest shoemaker that comes along. Perhaps, when you are taken down with the Typhus fever, instead of applying to a regularly-educated physician, the safest course is to call in the worthy tailor from next door, to bleed, blister and purge you according to his peculiar sartorial notions of physiology and pathology. Perhaps the moon is really made of green cheese, and all these new-fangled Cheese Factories will be undersold by the Man in the Moon, and driven at once out of the market. Perhaps the sky will fall, and then we shall catch all the quails. But to me these matters have a different appearance. I know that farmers generally believe everything that they see in print. I know that not one farmer out of a thousand is able to tell the difference, between the loud-mouthed impudent charlatan and the quiet and unobtrusive naturalist, who usually shrinks like the sensitive plant from everything verging upon controversy. And therefore I have thought it desirable to speak out, boldly, plainly and decisively, in this important matter, which involves pecuniary interests to the amount of hundreds of millions of dollars. Doubtless by so doing I shall offend Mr. Newcomer and Mr. Newcomer's friends. Doubtless I shall get but small thanks, even from the more intelligent class of farmers, who may be convinced by the facts and arguments that I have adduced, and who may, in consequence thereof, button up their breeches pockets tightly, when the gentleman from Maryland solicits their patronage. No matter. I am satisfied in my own mind, that one chief reason why Entomology is in bad repute with the generality of Farmers, is that Scientific men usually shrink back from the disagreeable task of exposing such unmitigated humbugs as this precious Maryland scheme. And therefore, I have thought it good not to mince matters, but to speak "right out in meeting." If the paper for which I am writing, or I myself as an individual, come to grief in consequence, the more's the pity. I have an invincible dislike for pretentiousness and charlatanism in all its forms—especially when it proposes to bleed the American public to the amount of $360,000 for a bag of moonshine—and come what will of it, I am determined to express my own honest unbiassed opinion on all such subjects.

THE TEXAN CABBAGE-BUG.

(*Strachia histrionica* Hahn.)

This is a true Bug, belonging to the Order Heteroptera and the Family *Scutelleridæ*, and shaped much like the large stinking Bugs often found in the Northern States on Raspberries and Blackberries. It is very prettily colored with black and yellow and is found in Texas and Louisiana. Below we give a very graphic account of the way in which it operates upon cabbages, turnips, radishes and other plants belonging to the botanical family Cruciferæ, from the pen of Dr. Gideon Lincecum of Washington County, Texas. It appears from his statement that there are two broods of them every year, the first hatching out in April and the second in July, and the insect passing the winter in the perfect state. We are indebted to Dr. Lincecum for specimens both of the winged insects and of their eggs, which arrived in excellent condition.

The year before last, they got into my garden and utterly destroyed my cabbage, radishes, mustard, seed turnips, and every cruciform plant. Last year, I did not set any of that order of plant in my garden. But the present year, thinking they had probably left the premises, I planted my garden with radishes, mustard and a variety of cabbages. By the first of April, the mustard and radishes were large enough for use, and I discovered that the insect had commenced on them. I commenced picking them off by hand and tramping them under foot. By that means I have preserved my 434 cabbages, but I have visited every one of them daily *now* for four months, finding on them from 35 to 60 full grown insects every day, some coupled and some in the act of depositing their eggs. Although many have been hatched in my garden the present season, I have suffered none to come to maturity, and the daily supplies of grown insects that I have been blessed with, are immigrants from some other garden.

The perfect Insect lives through the winter and is ready to deposit its eggs as early as 15th March, or sooner, if he finds any cruciform plant large enough. They set their eggs on end in two rows, cemented together, mostly on the underside of the leaf, and generally 11—12 in number. In about six days in April—four days in July—they hatch out a brood of larvæ resembling the perfect insect, except in having no wings, who immediately begin the work of destruction, by piercing and sucking the life sap from the leaves. In twelve days they have matured. They are timid, and will run off and hide behind the first leaf-stem, or any part of the plant that will answer the purpose. The leaf that they puncture immediately wilts, like the effects of poison, and soon withers. Half a dozen grown insects will kill a cabbage in a day. They continue through the summer, and sufficient perfect insects survive the winter to ensure a full crop of them for the coming season.

This tribe of insects do not seem to be liable to the attacks of any of the cannibal races either in the egg state or at any other stage. Our birds pay no attention to them, neither will the domestic fowls touch them. I have as yet, found no way to get clear of them, but to pick them off by hand.

The Striped Bug.

This insect is now busy puncturing the leaves of melons, cucumbers and several other plants and flowers. * * Among flowers they are particularly fond of German Asters, and when we see their leaves rusty, we may be sure that the enemy is at work.—*Western Rural*, July 21, 1866.

OBSERVATIONS BY B. D. W.—Two different species of the same genus are apparently here confounded together. The true striped Cucumber-bug (*Diabrotica vittata*—Fig. 2) has three black stripes placed lengthways on its wing-cases, and I have never seen it on flowers. The 12-spotted Flower-beetle (*Diabrotica 12-punctata*—Fig. 1.) has four rows of black spots placed lengthways on its wing-cases, each row consisting of three spots, and it is very injurious to flowers especially to Dahlias. It is also rather a larger and broader insect, and swarms more especially in the latter part of the summer, while the other is more abundant in the early part of the summer. Fig. 1, be it observed, is magnified fully 50 per cent in length, and fig. 2 about 100 per cent. I have, for many years, never failed in protecting my own cucumber and melon vines from the striped Cucumber-bug, by covering the hills with four short pieces of board, nailed together in the form of a bottomless box and roofed over at top with musketo-bar. As to the 12-spotted Flower-beetle, I know no remedy but hand-picking.

Fig. 1.

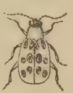
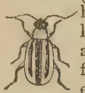


Fig. 2.



MORAL.—Flower-growers need not believe, that by killing the bugs off their neighbor's cucumber patch, they will save their own Asters and Dahlias.

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—Associate Editor.

Benj. Borden, Penna.—The small yellowish or very pale green, 16-footed caterpillars, about ⅓ inch long, with two white stripes and occasionally five rows of small irregular blackish spots placed lengthways on their backs, must be the larvæ of some species of *Procris*. You say they are very numerous and destructive on your grape-vines, devouring the whole leaf "except the fine gauze-like framework." Two or three of them spun up on the road, forming an oval whitish cocoon in the fold of a leaf. *Procris americana* has been long known to attack the grape-vine in this country, but the description of its larva does not quite agree with your insect, and besides it is too large a moth to come from so small a larva. I suspect that your insect will turn out to be the *Procris* (*acoloithus*) *falsarius* of Clemens, which has been redescribed by Dr. Packard as *Harrisina Sanborni*, and which Dr. Clemens tells me is quite common in Pennsylvania, and I myself know to be quite common in Illinois. There is a European species, *Procris vitis*, which has long been known to be very destructive to the grape-vine in Italy. The different species of *Procris* are in the winged state, black moths, with long narrow black wings and generally an orange-colored band behind the head. Unlike most other moths, they fly in broad day-light, and in the hottest sun are found upon flowers. Your larvæ, although they were four days on the road, arrived all alive and kicking, and in first-rate order, thanks to the tight little tin box in which you enclosed them, and which has the additional merit of keeping the leaves on which they feed perfectly fresh. The moths which I hope to breed from them will not appear till next summer, when I will let you know the result. The beetles you send, which you rightfully suspect of eating the vine-leaves, are the very same undescribed species of *Fidia* received from Mr. C. S. Jackson of Kentucky. See the answer to that gentleman in Practical Entomologist, No. 10.

Since the above was in type, I have bred (Aug. 9) several specimens of the moth from the caterpillars infesting your grape-vine, and it turns out to be the very species of *Procris* that I expected. Hence it is not improbable that this insect produces two broods of larvæ every year. Your larvæ were sent July 19th, so that only three weeks intervened between the larva and the moth states. Towards the middle of August you will perhaps find another lot of caterpillars on your vines.

J. Cope, Penna.—The yellow oval larvæ about ⅓ or ½ an inch long and with sprangling black prickles all over their backs, which you find feeding on the leaves of your squashes, and sometimes on the ripe squashes, belong to *Epilachna borealis*. This is a beetle of the *Coccinella* Family (Ladybirds), and is very remarkable for being the only known North American species of the Family that feeds upon vegetable substances, though there are several others that do so in Europe. All our other species, so far as is known, feed upon insects, and are very beneficial by checking the undue multiplication of the plant-feeders. Your species, when in the perfect state, may be readily distinguished by being yellow with fourteen large black spots arranged crossways on its wing-cases—6 and 6 and 2. These larvæ reached me in good order, but hungry—the leaves having dried up to a crisp.

"The worm with a dark colored head and a dark spot on the back of its neck, that destroys the Squash and Pumpkin vines by boring into them near the root" must be the larva of *Trochilium cucurbitæ* Harris. If so, it is a whitish worm nearly an inch long when full-grown and with sixteen legs, inclusive of two at its tail. The moth that comes from it has its front wings black and its hind wings clear and glassy. You will find a good colored figure of it in Harris's *Inj. Ins.* Plate V. fig. 8. The best mode of subduing this pest is to dig out and destroy the larva in every infested vine. Thus you will prevent it from going underground when full-fed, and coming out in the moth state the following season to lay its eggs for the next year's brood. The specimens you sent all bored round holes through the paper wrapper and escaped; Uncle Sam, however, facilitated their escape by squeezing the pasteboard box that contained them into all manner of shapes. I hope sincerely that, when they got loose in the mail-bags, they did not bore their way into some love-letter addressed to a young lady of delicate nerves. A tin box is the best to pack larvæ in, as it keeps both them and their food fresh and moist.

Thos. Conard, Penna.—You remark as follows:—"1st. Our potatoes are badly nibbled by some bug or worm and often almost ruined. 2nd. Our wheat this year is only half a crop because of the Wheat Midge; and the same was the case with our oats some years back. 3rd. My squash vines die suddenly, though in the best thrift. Why? 4th. My bees, too, do badly, and do not swarm. Why?"—Answers. 1st. I suppose it is the larva of the Three-lined Leaf-beetle (*Lema trilineata*) that is damaging your potatoes. If so, you may readily know it by its carrying its own dung on its own back. You will not find any now on the leaves, as they have gone underground to change into the perfect beetle, but towards the middle or the end of August there will be a second brood of them hatch out from eggs laid by the insects that are now underground. There is no known remedy, but shaking them off the vines into pans and then destroying them. 2nd. See "answers" to "R. F., New Jersey" and "M. H. Boye, Penna." in the last number of the Practical Entomologist, p. 101. It could not have been the Wheat Midge that attacked your oats some years ago, because that insect confines itself to Wheat and Rye. Perhaps it was the Grain plant-louse that did the mischief. 3rd. I expect your squash vines are bored close to the root by the larva of the Squash Borer (*Trochilium cucurbitæ*), respecting which see the "answer" to "J. Cope, Penna." in this number of the Practical Entomologist. 4th. You set me almost as hard a task as was set the prophet Daniel by King Nebuchadnezzar, when he required him to interpret a dream without telling him what the dream was. You give no particulars about your bees, and therefore it is as impossible for me to tell what ails them, as it would be for a physician in Illinois to tell what ailed your wife, if you wrote to him simply that your wife was not in good health. Half a hundred things may be the matter with your bees. They may be troubled by the Bee-moth, or they may be robbed by other bees, or it may be a bad season with you for making honey on account of certain flowers fail, or there may have been too many rainy days for your bees, or your hives may be bad or badly situated or near some foul-smelling place, or the impregnation of the queen may have been delayed to the 20th day, in which case she always produces nothing but drones, or the queen may be old and worn out, or your hives may have run short of honey last winter, or your neighborhood may be overstocked with bees, &c., &c. Bees are like other stock—they require constant care and attention, and the treatment must be varied according to the nature of each particular case.

E. Daggy, Ill.—The grape-leaves studded on their lower surface with scores of green globular bodies, varying from the size of a radish seed to that of a small pea, and each budding out into sundry little smooth bumps or excrescences, are troubled by a particular gall named *vitifoliæ* by Dr. Fitch. Like all other galls, this is the work of an insect, not of a plant-louse, however, as Dr. Fitch supposed, but, as I have recently ascertained, of a true bark-louse belonging to the *Coccus* family. Each globular body is a distinct gall, and it originates by the mother insect puncturing the leaf on its upper surface early in the season, which operation being continually repeated in the same spot causes an unnatural hollow lined with white woolly hair. In this hollow the mother-louse takes her station, sucking away at the sap and still further irritating the part, till finally the hollow enlarges, its mouth gradually closes, and you have a green fleshy bag with its mouth tied up pretty tight and the mother-louse inside. If you examine a leaf full of these galls, you will see on the upper side of the leaf a little woolly place opposite each gall on the lower side of the leaf. This is what remains of the woolly hollow which originated the gall. So far the process, with more or less variation in each case, is nearly the same with the plant-lice that make galls, numbers of which have been long known to Entomologists, and with the Barklice that make galls, of which I am now acquainted with three species. One of these species is the aforesaid *vitifoliæ* of Fitch, which I find on the wild Vitis cordifolia and on the tame Clinton grape-vine, another is the gall *caryæ-venæ* of Fitch, which I find exclusively on the leaves of the Shellbark Hickory (*Carya alba*), and the third is an undescribed gall the size of a cabbage-seed on the leaves of the Pignut

Hickory (*Carya glabra*). So far as I can find out, no galls have hitherto been described by authors as made by Barklice, neither indeed had any true galls been described as made by species of the *Psylla* family, till Baron Osten Sacken and myself discovered such on the Hackberry; but any Entomologist, by examining either of the above, may easily satisfy himself that the mother-louse inhabiting them does not belong to the *Aphis* but to the *Coccus* Family. Moreover, from the point in the process referred to above, the habits of the denizens of all the above three galls differ widely from those of the true gall-making Plant-lice. All these last, as their families increase inside the gall which they inhabit, secrete in common with their young larvæ a large quantity of sugary dust; while none of my three gall-making Barklice secrete anything of the kind. Again, all Plantlice whether they make galls or not, bring forth their young alive all through the summer and never lay eggs till the autumn; while all my three gall-making Barklice lay eggs during the month of July inside the gall, which do not hatch out till after the expiration of several weeks. It is further remarkable that, in all these galls made by Barklice, two, three, or even four mother-lice are often found in a single gall, along with numerous eggs or young larvæ or some eggs and some larvæ; whereas I do not remember ever to have found more than a single mother-louse in any single gall known to be produced by a Plant-louse. Hence it follows that several Barklice must sometimes cöoperate in making a gall and inhabit it afterwards as joint tenants. Moreover all these young Barklice stray away from the gall shortly after they are hatched, leaving their mothers behind them; while young Plantlice that inhabit galls stay there, along with their mothers, till they are full-grown and have acquired wings. My investigation of the Natural History of these insects is not yet completed; so that I cannot say what becomes of them in the winter.

I have seen dozens of wild grape-vines and two or three cultivated ones infested by these galls; but in no case were the galls sufficiently abundant to do material injury to the vine. Of course, considering that each louse lays about fifty eggs on a rough calculation, the breed, if nothing checked it, would soon increase till it destroyed the whole vine. But something does check it, and most efficiently too. There is a minute two-winged Fly about 1–16 inch long belonging to the great *Musca* family, the larva of which attacks these barklice in the most savage manner, insomuch that in the latter part of July nineteen out of every twenty galls contain either its orange-colored larva or its brown pupa-case, surrounded by the desolate ruins of what was once a quiet happy family of lice, snugly secluded from the world within the green walls of their own private domestic cell. It is the great law of Nature, practically carried out from one end of the Creation to the other—"Kill and be killed, eat and be eaten." Hence I do not think that there is much likelihood of these galls ever becoming so numerous on any vine, as to check its growth unduly. And probably, occurring as they chiefly do towards the tips of rampant shoots, they may even be beneficial in certain cases by operating as a summer pruning.

Let me beg of you in conclusion, Mr. Daggy, when you send specimens for the future, to enclose them as fresh as possible in a box of some kind. Botanists like their specimens dried up and pressed as flat as a pancake, but Entomologists do not. If I had not been quite familiar with your galls, and if I had not known that they occurred on the same cultivated variety of Grape on which you found them, I should not have been able to make head or tail of them from what you sent.

W. H. S., Bloomington, Ill.—The galls on the leaves of the Clinton grape-vine are precisely the same as those received from E. Daggy, of Tuscola, Ill; and for an account of them, I must refer you to the answer to that gentleman in this number of the PRACTICAL ENTOMOLOGIST. Several years ago I received the same gall from your town, unless my memory fails me. I see also from the *Prairie Farmer* (Aug. 4, 1866), that Mr. Riley has received it from Dement. Ill., and although he noticed the eggs in company with the mother-louse, yet, misled very excusably by the authority of Dr. Fitch, he pronounces the gall to be the work of a Plant-louse and not of a Bark-louse. Dr. Fitch indeed is sometimes a little too rash, not only in fixing the family to which a particular larva belongs, but in deciding even on the very genus to which it belongs, without being acquainted with the winged insect. For example, he refers the plant-louse of a cock's-comb like gall (*ulmicola* Fitch) on the leaf of a species of elm to the genus *Byrsocrypta*. I showed long ago that it belongs to the genus *Thelaxes*. Again, he refers the plant-louse of a gall on the leaf-stalk of the Shellbark Hickory (his *caryæcaulis*) to the genus *Pemphigus*. Both Baron Osten Sacken and myself are now acquainted with the winged insect, and it belongs to the genus *Phylloxera*, or rather perhaps to the American representative of that genus.

The irregular bunches or enlargements of the tendril, and occasionally of the leaf-stalk, of an imported German grape-vine, to some five or six time its natural diameter—in the latter case of the natural green color, in the former case strongly tinged with lake-red—are also galls made by another species of Bark-louse. This gall, however, is quite new to me, and as far as I know is undescribed. To me it is a peculiarly interesting one. The mother-louse here is of the same deep yellow color as in the other gall, and of the same almost globular shape; and it only differs in being ⅓ smaller—its diameter being *two* instead of *three*-hundredths of an inch. Several of them occur in a single gall, accompanied by their oval yellowish eggs, as in the other gall, but I did not notice any young larvæ hatched out. When ripe, this gall bursts open laterally in a large ragged mouth; but I opened some that had not yet burst, and they contained the same mother-louse and the same eggs. This louse appears to be also largely infested by the same deep yellow cannibal larvæ as that of Dr. Fitch's gall; but possibly these may have strayed from one gall to the other. For unfortunately you did not take the very necessary precaution to wrap up each set of specimens by itself. The genus to which both these two species of Bark-lice belong cannot be satisfactorily determined, till the winged male has been bred. The females in this family never acquire any wings at all.

As to getting rid of these galls, the obvious method, of course, is to cut them off and throw them away or otherwise destroy them, any time before the lice leave them. But I doubt much whether, in consequence of the diligence of the cannibal larvæ which swarmed in your specimens, they are likely to prove materially injurious. Certainly the *vitifoliæ* gall, at all events, is not, as you infer, caused by the vine growing in the shade; for I know a wild grape-vine growing in a fence-corner, with not a tree near it, which is covered with this gall.

What you take for "a partially open cocoon" on a leaf from the Isabella grape-vine is not a cocoon at all, but the dead and shrunken body of [illegible] sixteen-footed caterpillar about ¾ inch long, which would otherwise have changed to some small moth. As is very commonly the case, it has been destroyed by the larvæ of some parasitic *Chalcis* fly, which have eaten up its vitals; and, as usual in such cases, it has adhered strongly in death to the leaf on which it breathed its last, the parasites spinning a mass of flossy silk under its carcase, within which some of them have already changed into the pupa state. In the course of probably two or three weeks, they will come out in the form of four-winged flies ⅛ inch long, either of a black or metallic green color, with glassy wings. The species and genus cannot be determined from the larva and pupa. Of course this so-called cocoon has nothing whatever to do with the Bark-louse galls, as you say that one of your grape-growers fancied to be the case. One might as well infer that all the Lager-beer saloons in Bloomington were caused by the bodies of certain beef-cattle lying dead in your slaughter-houses.

Since the above was in type, I have bred (August 17) five specimens of the *Chalcis* flies from your so-called cocoon. They belong to a very beautiful species, which is quite new to me and is apparently undescribed.

Wm. J. Lawrence. Ohio.—The clay-yellow beetle nearly an inch long with six black spots on its back, which you find to infest your grape-vines, is *Pelidnota punctata*—a notorious offender in this respect. The small clay-yellow beetle about three-sixteenths inch long, but without any spots, is the *Colaspis flavida* of Say. You say that you "first noticed it on the Grape vines, about July 10th, and they soon increased to such numbers as to literally devour all the more tender leaves and young shoots, being worst on young vines." This is the first instance on record, so far as I know, of this species being injurious. It is common in the woods near Rock Island, Illinois, and I bred a specimen in 1861 from a pupa found underground at the root of a peach tree in South Illinois. Hence we may learn that, like the new Potato-bug, it goes underground to pass into the pupa state. As it belongs to the same *Chrysomela* family as that insect, the larva no doubt, as well as the perfect insect, feeds on the leaves of the grape vine. It will be a soft six-legged grub, probably of some pale color, with a horny head and an apology for a leg at the tip of its tail. *Pelidnota punctata*, on the other hand, belongs to an entirely different Family of Beetles, the Lamellicorns or Platehorns, and its larva, instead of eating green leaves, lives in very rotten wood. I have bred one myself from the stump of a Pignut Hickory, which was decayed enough to cut like cheese. Hence this last insect is only injurious in the perfect state, while the other is injurious throughout its entire existence.

Jos. S. Lewis, N. Y.—The larva of *Corydalis cornutus*, (a huge four-winged fly nearly as big as a man's finger,) lives in the water and preys upon various aquatic insects. It always crawls out of the water to pass into the pupa state, for which purpose it conceals itself under some log, plank or flat stone not far from the river it had previously inhabited. In these situations it is much sought after by fishermen, who call it a "crawler" and find it excellent fish-bait. In about three weeks' time it comes out in the perfect winged form, and it is the males only that have those extraordinarily long sickle-shaped jaws which are often mistaken for horns. Both sexes fly exclusively by night or twilight, and the females lay their eggs on something overhanging the water, so that the young larvæ as they hatch out may drop readily into their natural element. They are in no respect injurious to vegetation, and no doubt help to maintain the due equilibrium of Insect Life, by checking the too great multiplication of the various May-flies, Caddis-flies, Shad-flies, &c. that inhabit the water.

F. W. Noble, Missouri.—The pupa of the Tobacco Moth (*Sphinx Carolina* of Linnæus) arrived in first-rate order. The jug-handle like appendage under its head does really contain the long tongue of the future moth, which tongue, as you may have noticed, is, when uncoiled, nearly twice as long as the body of the Moth itself. The pupa lies underground, without eating anything, all through the winter and until the beginning of the following summer. Then the enclosed moth bursts the shell of the pupa and works its way out to the light of day, its wings being at first quite short and flabby, but gradually lengthening and stiffening in the course of an hour or so. The sexes then couple and the female lays her eggs on tobacco-plants, whence there soon hatch out the notorious tobacco-worms which are such a pest to tobacco-growers. Occasionally the potato-worm—which produces a very closely allied Moth (*Sphinx 5-maculata* of Stephens)—is found upon tobacco; but far more usually it feeds on tomato and sometimes on potato vines. Almost all these *Sphinx* moths fly round flowers in the dusk of the evening, sucking the honey from them with their long tongues, and many of them making a loud humming noise as they fly, whence they are frequently mistaken by the inexperienced for humming-birds.

Wm. H. Perry, Mass.—The black beetles about ½ inch long found in your wood-pile, and I expect under the bark, are the *Xylopinus anthracinus* of Knoch, a harmless insect feeding on various kinds of decaying wood, but not a borer. The three with black backs and chestnut-brown bellies are the common meal-worm in its winged state, very destructive to flour, meal, bran, &c. The large beetle with yellow spots is the *Clytus nobilis* of Harris, a true borer. The "gray-back" is also a borer, *Arhopalus fulminans*. The bright green beetle, running and flying with great agility in roads leading through timber land, is *Cicindela 6-guttata*, a very ferocious Cannibal. And "the small black bug common in fields and gardens" is nothing but your old friend the meal-worm again in its perfect or winged state. We have no chestnut here, and therefore I do not recognize from your description the rolls made out of chestnut leaves; they may perhaps be the nests of some leaf-cutting bee, (*Megachile*), but I cannot say for certain without seeing specimens.

Miss Isaure A. Plucke, N. Y.—The larvæ that "have destroyed your potato-vines for two years back and threaten to do the same this year" are those of the very same Three-lined Leaf-beetle (*Lema trilineata*), which, as you will see from the "Answers" to other correspondents, have recently reached me from all quarters in the Eastern States. Larvæ travel best enclosed in a small tight tin box, along with some of their natural food-plant by way of provision on the journey. Otherwise they usually die on the road and shrivel up badly; whereas scarcely any insects in the perfect state shrivel up when dead.

Saml. S. Lacy, Michigan.—The black caterpillars about an inch long, with long white hairs on their bodies, and found on the Black Walnut and Hickory, are the *Datana ministra* of Drury. A similar insect occurs on the Apple-tree, and on Oak, Thorn and a variety of forest-trees, but it then always differs from specimens found on Walnut and Hickory, by having a number of whitish and yellowish lines placed lengthways on its body, and generally by having also a large yellow patch placed immediately behind its head, whence it was called in English by Dr. Fitch "the yellow-necked worm." As I have experimentally proved, the yellow-necked variety of the larva found on the Oak produces exactly the same Moth as the black larva found on the Hickory. Yet they must be distinct species, because the black caterpillars found on the Walnut, cannot, as I have just ascertained, be compelled to feed either on Oak leaves or on Apple-tree leaves. These caterpillars usually create considerable alarm, when found on Apple-trees, because they gather in crowds upon a single limb, till they have entirely stripped it of its leaves. But this very habit of theirs makes it much easier to destroy them, than if they scattered themselves one by one over the whole tree. They are a very common insect throughout the Northern States. The eggs sent are, I think, those from which your caterpillars hatched out; but the eggs of moths are many of them so nearly alike that I cannot say so with certainty. The larvæ go underground to change into the pupa state, and the perfect moth does not come out till the following summer, when she lays her eggs on the leaves of the infested trees. You will find a good colored figure of the Moth in Harris's *Inj. Ins.* plate VI. fig. 6.

F. K. Phoenix, Ill.—The beetle that, as you say, "destroys grape-vines by feeding on the ends of the shoots" is the *Colaspis flavida* of Say. See the Answer to Wm. J. Lawrence in this No. of the PRACTICAL ENTOMOLOGIST. The small bluish-green jumping Beetle scarcely ⅛ inch long is the *Haltica exapta* of Say. It comes very near the *Haltica chalybea* that is such a pest to the vine-growers, but is smaller, slenderer and not of a pure blue color, and its sculpture also differs. The genus contains an immense number of species, many of them very closely allied, and your florist may possibly be mistaken in thinking, that he saw the same insect five years ago in New York. Familiar as I am myself with insects, I never dare name a *Haltica* without comparing it closely with the named specimens in my cabinet. The little flea-beetles that destroy seedling cabbages and radishes and also young egg-plants, belong to this same genus. To protect my own egg-plants when young, I always cover them over with a bottomless box roofed with musketo-bar, such as I use to keep the Cucumber-beetle from my vines. Your species, you say, is "*very* destructive on your Fuschias." It must feed on other plants as well; for I find it here away from any gardens, though by no means abundantly.

Joel Barber, Wisc.—The black blister-beetle about ⅔ inch long with a narrow gray edging to its wing-cases is *Lytta marginata* (Olivier). It usually feeds on different species of Clematis (virgin's bower) and Ranunculus (buttercups), but last year I found a large colony of them feeding on Silphium perfoliatum. It has not hitherto been observed to attack the potato, as you say it has done with you, though there are three other species of the genus that do so—*vittata, cinerea* and *atrata*. It is not likely that for the future you will find more than a few stray specimens on your potato-vines. The remarkable spider you send has long been well known to me. It was described and named five or six years ago in the *Prairie Farmer* by Cyrus Thomas; but I forget the name he gave it.

A. Burlingame, Ohio.—The eggs found on the leaf of a cherry tree are those of some moth, but from their shrivelled state and their having been taken off the leaf, I cannot say for certain what species they belong to. They would have produced some kind of caterpillar, not improbably that of the Red Humped Prominent (*Notodonta concinna*).

J. F. Benner, Ohio.—The small pale brown beetle "doing a great deal of damage to your grape-vines this season, though you had never noticed them before on the grape-vine" is the *Colaspis flavida* of Say. You are the third correspondent from whom within the last month I have received this insect with the same statement as to its habits. See the "Answers" to W. J. Lawrence and F. K. Phoenix in this Number of the Practical Entomologist.

The three-lined leaf-beetle, bred from larvæ that cover themselves with their own dung and feed on the leaves of the Potato, is the *Lema trilineata* of Olivier. You will find it figured and described in Harris's *Inj. Ins.* p. 118. It is very common in the Eastern States, but I was not previously aware that it ever occurred in such numbers as it has done with you, in the Valley of the Mississippi. You say you found "about a dozen larvæ together on a leaf or branch." That is more than I have met with in eight years near Rock Island, Illinois. Your method of breeding the perfect beetle from the larva was excellent, and for the benefit of those who may be similarly situated I will now copy it out in full. "I procured a small box, put some moist earth on the bottom, and on it the grubs, together with the leaves on which they were, with others for their food. They ate heartily for a few days and on the 15th July disappeared. On examining the earth, I found them in small whitish cocoons fastened to the bottom of the box. I set them by and watched them daily. On 30th July I found the perfect beetles in the box; and on examining the cocoons, I found them all empty."

Huron Burt, Missouri.—You say that "last year your gooseberries and currants were all destroyed by a green worm; the crop was abundant, but not a berry ripened. This year scarcely a worm was to be seen, and the most abundant crop of berries ripened that we have ever had. The weather last year was very dry till July, and the remainder of the season was excessively wet." The "green worm" was probably the larva of the "Gooseberry Saw-fly," respecting which see my Article in the next number of the Practical Entomologist. Not improbably the excessive rains in July may last year have drowned out the pupæ as they lay underground in their cocoons; or possibly some Ladybird may have taken to eating their eggs, or they may have been violently attacked by some other Cannibal insect or by some Parasite. On the same principle, the Army-worm swarms in certain years, and in other years is found in such small numbers that Farmers do not notice it. And so with many other Noxious Insects. I do not think that excessive heat or excessive drought ever kills insects, but it has long been known that in the case of the common Chinch-bug excessive rains, or even a few heavy showers, will drown out their eggs, which are laid at the roots of the infested plants, and put a sudden stop to their multiplication.

You say that an insect which you take for the "three-lined leaf-beetle" (*Lema trilineata*) is very numerous with you this season. "They first," you observe, "devour the potato-vines, then tomato-vines, beet-tops, cabbages, the weed called Careless, [a species of Amaranthus which has been introduced here from Tropical America,] Belladonna and parsley; and in case of necessity they will even eat horse-nettle and the different docks." It is not at present known that the true "three-lined leaf-beetle" is such a general feeder. Please send me specimens that I may be certain of the fact. You will find a notice of its habits in the "answer" to J. F. Benner in this number of the Practical Entomologist. If this is really your insect, there will be a second brood of it hatch out shortly, which will go underground in the larva state and not come out in the perfect state till next summer.

Henry Shimer, Ill.—The gall on the root of a wild rose has been described by Osten Sacken, and the gall-maker is *Rhodites radicum* O. S., all that you send being females. The green, long-tailed parasite is a female *Callimome*, the black short-tailed parasite a female *Eurytoma*, both genera belonging to the *Chalcis* family, and both having been reared from this very gall, according to Osten Sacken. (*Proc.* &c. II, p. 42.) The two-winged gall-fly is *Trypeta solidaginis* Fitch, and its round, smooth, musket-ball like gall occurs on the stem of a species of Solidago (Golden rod). This is the same insect, as Osten Sacken has shown, which was erroneously believed by Dr. Harris to form a similar gall on a species of Aster, and named in consequence by him *Trypeta asteris*. Such a mistake is easily made in the winter, when nothing but the dead dry stem of the plant remains. The cock's-comb like gall on the leaf of an elm was described by Dr. Fitch as *ulmicola;* and the winged insect was first described* by myself as *Thelaxes ulmicola*. We should be glad of a *male* of the *Rhodites;* the other species are all common. Throughout the genus *Rhodites* the males are comparatively rare, sometimes exceedingly rare; and they are readily distinguished from the females by lacking the acute, horny "ventral valve" on the lower part of the abdomen.

T. H. Parsons, N. Y.—The potato bug that troubles you is the *Lema trilineata* of Olivier, which is very common in the Eastern States, though in eight years collecting I have only met with seven or eight specimens in Illinois. You will find a good figure of the perfect beetle in Harris's *Injurious Insects*, p. 118. Western men find that common fowls will not feed on the New Potato Bug to do any good, though turkeys will. The "striped borer about one-twelfth inch in diameter and three-fourths of an inch long," that attacks the stem of the young Indian corn, is probably a species of *Gortyna*, distinct from the well-known *Gortyna zeæ* of Harris, the larva of which is said to be fully one inch long and not "striped," as you say yours is, but "with a double row across joints 3—11 of shining, slightly elevated black dots." The perfect moth of this last is figured in Harris, Plate VII, fig. 9. You will do well to try and rear the the moth from your larva. The only general rule that can be given for breeding insects is, to place them as nearly as possible in the same situation with regard to moisture, food, heat, location &c. as they would be in if they were at large. Your insect will transform into the pupa state most probably within the stem of the corn that it has invaded, and most probably will not come out into the moth state till next spring. I can of course say nothing with any certainty about the worm which, as your neighbors tell you, has destroyed whole acres of Sugar-maples in your vicinity by feeding on the leaves, and attacks also other forest-trees. Not improbably, however, it may be the well-known "Palmer-worm," which in particular seasons operates in this manner in your State.

M. S. Hill, Ohio.—The tough brown silken cocoon, about three inches long, which you found last May on an Apple tree, is that of *Attacus cecropia*—a gigantic moth measuring nearly six inches across the wings, and closely allied to the imported moth of the Ailanthus Silkworm. The "small worm," that you suppose to have destroyed the pupa inclosed in the cocoon and to be a true parasite, is the larva of some small moth, several of which prey on *dead*, not *living* animal substances, and are sometimes very destructive to objects of Natural History. I found a single specimen inside the empty shell of the pupa and will endeavor to breed the perfect moth from it, in which case I will advise you further. It was a yellow 16-footed larva about ¾ inch long with a few white hairs on its body and a bay-colored head. In all probability the pupa in your cocoon died a natural death, and after it was dead the mother-moth deposited her eggs on the cocoon, the larvæ hatching out from which, crawled in at the upper end, which is only partially closed with silk, and fell to work on the carrion. There are special agents in all directions, appointed by an all-wise Providence to clear away all decaying substances, whether animal or vegetable, and prevent them from becoming offensive and injurious to health. Every day of my life I am lost in admiration at the wondrous perfection of the system, which maintains in health and happiness upon the face of this earth so vast an amount of Animal Life; one species checked and controlled by another, and this by another, and this again by a third, so that it scarcely ever happens, and then only for a short time, that any particular species becomes unduly numerous, except where man, by his artificial arrangements, interferes with the great scheme of the Creaton.

Jas. Barratt, Mass.—I have since bred the perfect insect from your cocoons, and it proves to be just what I anticipated—the *Lophyrus abietis* of Harris.

ERRATUM.

In Practical Entomologist No. 10, p. 102, column 1, line 35, for "properly speaking" read "popularly speaking."

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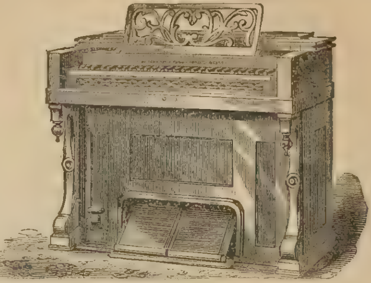

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Coleoptera of Kansas and Eastern New Mexico, by J. L. LeConte. 1859. 4to. pp. 66 and 3 plates. Price $1.25.

Synopsis of the Neuroptera of North America, by H. Hagen. 1861. 8vo. pp. 368. Price $2.00.

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PHILADELPHIA, SEPTEMBER 29, 1866.

* * *

We take pleasure in announcing that, although the desired number of subscribers is not yet made up, we shall continue the publication of the *Practical Entomologist* another year, because we believe that, through the continued exertions of our friends, we shall have 5000 names by the issue of the October number. Therefore, those who have sent in their names as subscribers for the second year, may, if they feel so disposed, send us their subscription money *now*, or, on the receipt of the October number. In remitting the money, please do not send us mutilated or defaced currency.

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THIS NUMBER

is occupied chiefly by a long, valuable and interesting article by Mr. Walsh on the Natural History of the Sawfly of the Gooseberry and Currant. As this Insect Pest promises to do an immense amount of damage, it would be well for every one who cultivates the fruit to read the article over carefully. Several interesting communications and answers to correspondents have been crowded out, but these will appear in the next number.

IMPORTED INSECTS;—The Gooseberry Sawfly.

BY BENJ. D. WALSH, M. A.

It is a remarkable fact, that fully one-half of our worst Insect Foes are not native American citizens, but have been introduced here from Europe. The Hessian Fly (*Cecidomyia destructor* Say) was imported almost ninety years ago—the Wheat Midge (*Diplosis tritici* Kirby) about half as long ago—the Bee Moth (*Galleria cereana* Fabr.) at the beginning of the present Century—the Codling Moth (*Carpocapsa pomonella* Linn.), the Currant Borer (*Trochilium tipuliforme* Linn.), the Bark-louse of the Apple tree (*Aspidiotus conchiformis* Gmel.), the Cheese-maggot (*Piophila casei* Linn.), the Meal-worm (*Tenebrio molitor* Linn.), the Grain-weevil (*Sitophilus granarius* Linn.), the House-fly (*Musca domestica* Linn.), the Leaf-Beetle of the Elm (*Galeruca calmariensis* Fabr.), the Cockroach (*Blatta orientalis* Fisch.), and the different Carpet, Clothes and Fur Moths, at periods which cannot be definitely fixed. And even within the last few years the Asparagus Beetle (*Crioceris asparagi* Linn.) has made a lodgement in the State of New York, and will no doubt gradually spread westward from that point through the whole United States. I now have to record the appearance among us from across the Atlantic of a bitter enemy to the Gooseberry and Currant—the Gooseberry Sawfly.

One would suppose at first sight, since there are about as many voyages made from America to Europe as from Europe to America, that we should have reciprocated to our transatlantic brethren the favors which they have conferred upon us, in the way of Noxious Insects. It is no such thing. Neither the Chinch Bug (*Micropus leucopterus* Say), nor the Curculio (*Conotrachelus nenuphar* Herbst), nor either one of our two principal Apple-tree borers (*Saperda bivittata* Say and *Chrysobothris femorata* Fabricius), nor the Cankerworm (*Anisopteryx vernata* Peck), nor the Apple-tree web-worm (*Clisiocampa americana* Harris), nor the Peach-tree borer (*Trochilium exitiosum* Say), nor any other of our Native American Insect Foes has ever, so far as I am aware, emigrated from this country to Europe and effected an extensive and permanent settlement there. For although on one or two different occasions single specimens of our Army-worm Moth (*Leucania unipuncta* Haworth) have been captured in England, yet it has never hitherto spread and became ruinously common there, as it continually does in America. Our destructive pea-bug or rather pea-beetle (*Bruchus pisi* Linn.) has also found its way to Europe; but although it is met with in England, Kirby and Spence expressly state that it does not occur there "to any very injurious extent." (*Introd.* letter 6.) Again, the only species of White Ant that exists within the limits of the United States, (*Termes frontalis* Köllar,) has been known for a long time to be a guest in the Plant-houses of Schönbrunn in Germany; but it is not recorded to have ever as yet spread into the surrounding country. A very minute yellow ant, however, (*Myrmica molesta* Say,) which often infests houses throughout the United States, has, according to Frederick Smith, "become generally distributed and naturalized" in houses in England; (Stainton's *Entom. Ann.* 1862, p. 70 and 1863, pp. 59—62;) and Kirby and Spence state more specifically that "it has become a great pest in many houses in Brighton, London and Liverpool; in some cases to so great an extent as to cause the occupants to leave them." (*Introd.* Letter 8.) As to the Woolly Aphis of the Apple-tree, (*Eriosoma lanigera* Hausmann,) which was formerly misnamed in Europe "the American Blight," it was proved long ago, that instead of having been imported from America into Europe, it was in reality imported from Europe into America. (Harris *Inj. Ins.* p. 242)* The same law seems to prevail in the Vegetable Kingdom also. For while we have imported from the Old World a whole host of noxious weeds, but very few native American plants have established themselves on the other side of the Atlantic.

"But," the curious reader will ask, "what can be the reason for such a strange anomaly?" The reason is that, although this is popularly known as the New World, it is in reality a much older world than that which we are accustomed to call the Old World. Our plants and our animals mostly belong to an old-fashioned antediluvian creation, not so highly improved and developed as the more modernized creation which exists in Europe. Consequently they can no more stand their ground against European competitors imported from abroad, than the Red Indian has been able to stand his ground against the White Caucasian race. On the other hand, if by chance an American plant or an American animal finds its way to Europe, it can, as a general rule, no more stand its ground there against its European competitors, than a colony of Red Indians could stand their ground in England, even if you gave them a whole county of land and a hundred shiploads of stock, tools and provisions to begin with. I refer here, of course, only to what is called the naturalization of a plant or an animal, i. e. its becoming able permanently to maintain itself in a state of nature in any particular country. For there are plenty of American plants and animals, which are artificially domesticated in Europe, the Potato and the Turkey for example. But who ever heard of Potatoes and Turkeys running wild in Europe, as the European Horse has run wild in Mexico, and the European Cow in Buenos Ayres, or as the European purslane has spread over every garden and field in the United States?

Let not "Young America," however, be discouraged and disgusted at hearing, that our Animal and Vegetable Creation is more old-fashioned than that of what is commonly known as the Old World. There is a large Continent, which is as much more old-fashioned than America in its plants and animals, as America is more old-fashioned than the so-called Ancient Continents. In America we have but a single mammal—the opossum—that brings forth its young before they are fully developed, and carries them about with it in a pouch, till they are ready to be born again in a complete state of development. In the Old World they have none at all. In Australia almost all their mammals possess this remarkable peculiarity, which characterizes the first and earliest mammals that are known to have existed in ancient geological times; and in addition they actually have a mammal—the Ornithorhyncus—that has a bill like a duck and lays eggs like a duck, thus forming a degraded type connecting the Mammals with the Birds. If Europe crows over us, we can crow over Australia. If the American creation is old-fogyish, that of Australia is more old-fogyish still.

When accounts arrived in Europe, towards the close of the last Century, of the frightful manner in which the Hessian Fly was destroying the Wheat crop in the United States, the British Government was so greatly alarmed at the idea of its being imported from America into England, that they actually called a special Meeting of the Privy Council, to deliberate on the best and most advisable means of excluding the little pest. They need not have alarmed themselves at all about the matter. It is now clearly proved, that the Hessian Fly has existed time immemorial in Europe, but in such limited

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*A species of Cockroach (*Blatta americana* Burm.) has also, as the name indicates, been supposed by some to have been imported from America, not only into the seabord of England, but also into the Mauritius and the Isle of Bourbon. It exists undoubtedly at the present day on the seabord of the United States, but I suspect that it was originally introduced there from Eastern Asia. Westwood mentions having seen it "swarming in a vessel recently arrived [in England] from the East Indies." (*Introd.* I, p. 417.) America has so little commercial intercourse with the Mauritius and the Isle of Bourbon, that it seems improbable that a noxious insect should pass from one country to the other. On the other hand these two islands are in frequent communication with Hindostan and China, and import at the present day many Coolies therefrom. Brullé also considers the American nativity of this insect as very problematical. (*Hist. Nat. Ins.* IX. p. 33.) I have never met with it in Illinois and do not believe that it exists there. Our common Cockroaches, which do not however occur in houses but only in the woodlands, are *Platamodes pennsylvanica* DeG. and *Pl. unicolor* Scudd., which last species has been erroneously described by Mr. Scudder as only one half of its actual size. Both of these occur also in similar situations on the seabord of the Eastern States, and in the houses there the imported *Blatta orientalis* Fisch., which is such a pest in European houses.

numbers as never, except in a very few localities, to have attracted the attention of the European farmer. Why then, when it reached America, should it have increased and multiplied at such a prodigious rate, destroying the wheat like a devouring fire as it gradually advanced through the country? The answer is simple. Here it had only three or four parasites to check its increase, and these were of the old-fashioned American type, not so highly improved and developed as the European parasites, that had for ages untold preyed upon it in its native home, and prevented it from increasing there to any alarming extent. The case was pretty much as if Louis Napoleon were to land an army of a hundred thousand Frenchmen, of the highly improved Caucasian race, in the United States, and we had nothing to oppose to that army but a crowd of Red Indians of the old-fashioned indigenous North American type. But in some cases the foreign invader has scarcely had even an indigenous old-fogyish foe to contend against. To this day it is not known, that any indigenous North American parasite has attacked the Wheat Midge, since it landed upon our shores some forty years ago; and unless it be true, as I believe, that the *Thrips* of entomologists—not the *Thrips* of the vine-growers, for that is a plant-feeding insect—preys largely upon the Wheat midge in its larva state in certain locations in the United States, it is not even known that any indigenous North American cannibal insect preys upon it within the limits of the United States, although undoubtedly our American Goldfinch does so to a considerable extent. Can we wonder, under such circumstances, that the foreign invader sweeps the whole country? Can we wonder that in one single year, as has been proved by official documents transmitted to the Secretary of the New York State Agricultural Society, the Wheat-midge inflicted upon the single State of New York damages to the enormous amount of fifteen millions of dollars? During the Revolutionary War the British forces, as is well known, did us large pecuniary damage. They also accidentally, in the course of the war, imported among us the Hessian Fly, in some straw that their Hessian mercenaries brought with them. Let any one compute the whole amount of pecuniary damage, purposely and directly inflicted upon us during that war by the British Army and Navy, and then go to work and compute the pecuniary damage, that has since that time been indirectly and unwittingly inflicted upon us by the British Army, through the instrumentality of the Hessian Fly; and he will find that the latter amount is a thousand fold as large as the former.

The plain common-sense remedy for such a state of things is, by artificial means to import the European parasites, that in their own country prey upon the Wheat Midge, the Hessian Fly and the other imported insects that afflict the North American farmer. Accident has furnished us with the bane; science must furnish us with the remedy. It is no use trying to fight White Frenchmen with Red Indians. The highly improved race may perhaps be slightly checked and harrassed by the primitive indigenous foe, but in the end it will be certain to come out victorious. Naturalists differ widely, as to what was the origin of the different sets of animals and plants that now exist in different countries, and that have, ages and ages ago, existed in the different geological epochs, that preceded the advent of Man upon the earth. But no naturalist at the present day disputes the fact, that the plants and animals of North America, for example, are, as a general rule, distinct from the plants and animals of Europe, and that, as a whole, they are of an inferior and less highly developed type. If it were not so, how could we possibly account for the very singular facts enumerated above? But the scientific mind is always ahead of the popular mind. Vaccination, Gas, the Steam-engine, the Steam-boat, the Rail-road, the Electric Telegraph, have all been successively the laughing-stock of the vulgar, and have all by slow degrees fought their way into general adoption. So will it be with the artificial importation of parasitic insects. Our grand-children will perhaps be the first to reap the benefit of a plan, which we ourselves might, just as well as not, adopt at the present day. The simplicity and comparative cheapness of the remedy, but more than anything else the ridicule which attaches, in the popular mind, to the very names of "Bugs" and "Bug-hunters," are the principle obstacles to its adoption. Let a man profess to have discovered some new Patent Powder Pimperlimpimp, a single pinch of which being thrown into each corner of a field will kill every bug throughout its whole extent, and people will listen to him with attention and respect. But tell them of any simple common-sense plan, based upon correct scientific principles, to check and keep within reasonable bounds the insect foes of the Farmer, and they will laugh you to scorn. Probably about nine-tenths of the Members of Congress and of our different State Legislatures are lawyers, busying themselves principally with Law and Politics; and the remaining one-tenth are Physicians, Merchants and Manufacturers, with a *very* small sprinkling of Farmers. Is it to be expected that a crowd of men, whose heads are mostly full of such important things as Cognovits and Assumpsits and Demurrers and Torts and Caucuses and Conventions, should condescend to think about "Bugs?" What do they know about Farmers, except that they have got votes? Or about Farmers' pockets, except that most of the taxes come out of them? What do they know or care about Entomology, fancying, as most of them do, that Entomologists busy themselves exclusively in collecting the greatest possible number of beautiful butterflies? Talk to them of science, and they smile in your face. They are so perpetually teased and tormented by scientific charlatans—wolves in sheeps' clothing—lobbying for legislative assistance for all kinds of ridiculous impossibilities, that they have come to believe firmly, that Science is only another word for Humbug and Imposture.

I am confident that if one-hundredth part of the pecuniary damage, that is annually inflicted by

Noxious Insects upon the farmers, were inflicted, instead, upon the Merchants or upon the Manufacturers, thousands of dollars would have been long ago voted by Congress to discover some remedy or some palliation of the evil. Why? Because the Merchants, as a class, act in one solid body; the Manufacturers, as a class, act in one solid body; while the Farmers of the United States are nothing but a mere rope of sand. It is the old Greek fable of the bundle of sticks, practically translated into modern English for the benefit of "whom it may concern."

THE IMPORTED GOOSEBERRY SAWFLY.

Unlike the Wheat-midge, the Gooseberry Sawfly, whose Natural History I am now about to elucidate, has already been attacked by an indigenous North American parasite—the *Brachypterus* [*cryptus*] *micropterus* of Say. But this parasite is of extreme rarity, as, exclusive of a single specimen bred by myself from the cocoons of this Sawfly, I have only met with two poor solitary specimens in the course of eight years' steady collecting. It is not probable, therefore, that it will effect much towards checking the rapid increase of this insect, though it is certainly possible that other parasites, which I have not as yet detected, may already be in arms against the invader.

The imported Gooseberry Sawfly (*Nematus ventricosus*, Klug) comes out of the ground soon after the leaves of the gooseberry and currant bushes, upon which it feeds, put forth in the spring. My specimens, reared from cocoons obligingly furnished to me by Dr. Wm. Manlius Smith, of Onondaga County, New York, came out April 21—27. The sexes then couple, as usual, and the female proceeds to lay her eggs "along the stems on the under side of the leaf," according to Mr. Bigelow, of N. Y. From these eggs shortly afterwards hatch out minute green larvæ or worms, which at first have many black dots on their backs, but after moulting their skins for the last time are often entirely of a grass green color, except the large dark eye-spot on each side of the head found in all larvæ belonging to this genus. By this time they are about ¾ of an inch long, and, from their greatly increased size, make their presence readily known by the sudden disappearance of the leaves from the infested bushes. Shortly afterwards, having attained a length of fully three quarters of an inch, they burrow underground, generally beneath the infested bushes, and spin there a thin oval cocoon of silk, within which they assume the pupa state. About the last week in June or the first part of July, or occasionally not until the beginning of August, the winged insect bursts forth from the cocoon and emerges to the light of day; when the same process of coupling and laying eggs is repeated. The larvæ hatch out from this second laying of eggs as before, feed on the leaves as before, and go underground as before; but the perfect fly from this second brood does not come out of the ground till the following spring, when the same old series of phenomena is repeated. My specimens of the summer brood of flies, reared from cocoons received from Dr. Smith, of N. Y., came out June 26—August 13, and most of them by July 11. Of course there will be some little variation in the time according to the season and the latitude.

Larva. A pale green worm ¾ inch long, with three rows of black dots placed crossways on the joints of the body and a black head; after the last moult often losing all the black dots, and the head changing from black to green.

Nearly mature. Length ¾ inch. Pale green, verging on yellow towards the tail. Head black, polished, with numerous short hairs proceeding from minute tubercles. Mouth, except the mandibles, pale green. Joints of the body above with rows of small shining black tubercles placed crossways, and each bearing a hair in the less mature specimens, but in the largest and most mature ones bearing no hairs at all, except the larger tubercles on the sides. First joint behind the head with a single row of dorsal tubercles; joints 2 and 3 each with a double row, the anterior one curved forwards in the middle in a semicircle; joints 4—12 with a treble row; the anal plate black, polished, and prolonged at each posterior angle in a slender acute thorn, and having, besides the triple row of tubercles before it, a group of six or eight tubercles on each side of and partly before it. A longitudinal row of larger lateral black tubercles on joints 2—12, one on each joint, beneath which there is a geminate black tubercle above each proleg, all these tubercles bearing many hairs. Legs black, the sutures pale green. Prolegs fourteen, pale green, all but the two anal ones with a few minute black dots towards their tip in front. Joints 4 and 11 without prolegs.

When mature, the larva, according to Mr. Bigelow, is said to "change its skin to a pale green," as the European larva does, according to many authors; but I have not seen any specimens in this state. I suspect that in many individuals this change does not take place, and that in these the black tubercles remain throughout in the mature larva, while the hairs proceeding from them disappear, as in the largest specimens described above, which were almost an inch long, and still retained the black hairy head found in the smaller specimens, and the black anal plate. Described from thirty or forty specimens of various sizes, well preserved in Mr. Verrill's brine-mixture by Dr. Smith, of New York.

As is very generally the case in the genus *Nematus*, the males and females of this Sawfly differ so widely, that they would scarcely be taken by the inexperienced Entomologist for the same species. I subjoin a full description of each, based upon very numerous specimens, all bred by myself.

Female Fly. A four-winged fly rather larger than a common house-fly, with glassy wings and the body mostly yellow.

Body bright honey-yellow. *Head* black, with all the parts between and below the origin of the antennæ, except the tip of the mandibles, dull honey-yellow. Antennæ brown-black, often tinged with rufous above except towards the base, and beneath entirely dull rufous except the two basal joints: four-fifths as long as the body, joint 3 when viewed laterally, four times as long as wide, joints 3—5 equal in length, 6—9 very slowly shorter and shorter. In two females the antennæ are 10-jointed, joint 10 slender and ⅔ as long as 9. *Thorax* with the anterior lobe above, a wide stripe on the disk of each lateral lobe which is very rarely reduced to a mere dot, or very rarely the whole of each lateral lobe, a spot at the base and at the tip of the scutel, the two spots sometimes confluent and very rarely subobsolete, a small spot at the outer end of each cenchrus and a geminate small spot transversely arranged between the cenchri, the tip of the metathoracic scutel, the front and hind edge above of what seems the 1st abdominal joint but is in reality the hind part of the metathorax, or very rarely its whole surface above, and also the whole lower surface of the breast between the front and middle legs, or very rarely two large spots arranged crossways on that surface, all black. Cenchri whitish. *Abdomen* with joints 1 and 2 very rarely edged at tip with black. Sheaths of the ovipositor tipped more or less with black, the surrounding parts sometimes more or less tinged with dusky. The triangular membrane at the base of the abdomen above, whitish. *Legs* bright honey-yellow; all the coxæ and trochanters whitish; the extreme tip of the hind shanks and the whole of the hind tarsi brown-black. *Wings* glassy; veins and stigma brown-black, the latter as well as the costa obscurely marked with dull honey-yellow. In a single female all three submarginal cross-veins are absent in one wing, and only the basal one is present in the other wing. In another all three are indistinctly present in one wing, and in the other only the basal one and a rudiment of the terminal one. In a single wing of two others the terminal submarginal cross-vein is absent. And in a single female there are but three submarginal cells in either wing, precisely as in the genus *Euura*. Length ♀ .22—.28 inch. Front wing ♀ .27—.33 inch. Expanse of wings ♀ .53—.64 inch, (wings depressed.)

Male Fly. A four-winged fly, the size of a common house-fly, with glassy wings and the body mostly black.

Body black. *Head* with the clypeus and the entire mouth, except the tip of the mandibles, dull honey-yellow. Antennæ brown-black, often more or less tinged with rufous beneath except towards the base, as long as the body, the joints proportioned as in the female, but the whole antenna, as usual in this sex, vertically much more dilated, so that joint 3 is only 2½ times as long as wide when viewed in profile. *Thorax* with the wing-scales and the entire collare honey-yellow. Cenchri whitish. *Abdomen* with more or less of its sides, the extreme tip above, and its entire inferior surface, honey-yellow. *Legs* as in the female. *Wings* as in the female. In two males the middle submarginal cross-vein is absent in both wings, so that if captured at large they would naturally be referred to the genus *Euura*. In two others this is the case in one wing only. Another has but the basal submarginal cross-vein remaining in each wing. And in two others the terminal submarginal cross-vein is absent in one wing. Length ♂ .20—.22 inch. Front wing ♂ .23—.25 inch. Expanse of wings ♂ .44—.51 inch, (wings depressed.)

Described from twenty-two males and thirteen females, three males and one female of the spring brood. As this solitary female happened to be one of the two with 10-jointed antennæ, I erroneously stated, in answer to a correspondent, that this was a peculiarity of the species. It is evident now that it is merely a variation, but a variation of a kind of which no other example in the whole Family of Sawflies is known to me, or, so far as I am aware, is recorded by others. For the satisfaction of the incredulous, I have donated one of these abnormal females to the Collection of the Society at Philadelphia.

I believe, on carefully comparing Stephens's description of the English *Nematus ribesii*, which is said by him to "feed on the common red currant," that our American insect is the same species, although he describes the legs as having no dark markings, and although he had the incredible carelessness not to state which sex he was describing. Otherwise his description agrees very well with our female, after making the necessary allowances for so slipslop a describer. But long before Stephens wrote, our insect was described by the German entomologist Klug, under the name of *Nematus* [*tenthredo*] *ventricosus;* and this species, it is distinctly stated, feeds both upon gooseberry and currant. Our insect, also, as is expressly stated by Mr. Otis Bigelow of N. Y., feeds both upon the currant and upon the gooseberry; (*American Agriculturist*, May, 1865, p. 141;) but it appears that certain European authors, finding this same insect upon two distinct plants, the gooseberry and the currant, jumped to the conclusion that the insects themselves were also necessarily distinct.[*] Two female specimens that I have received from England from a rather unreliable source, through the kindness of Mr. Norton, labelled as the true *Nematus ribesii* of Stephens, differ altogether from Stephens's description and must have been so labelled by mistake. Neither is it possible, from the laws of sexual coloration in this genus, that Stephens described the male and not as I suppose the female of his species, and that these are the true females belonging to his *ribesii*. For instead of the body being lighter colored than he describes it, as it ought to be if these were the females of his males, it is very much darker colored. At any rate these females are quite distinct from the females of our species. Those who desire fuller information on this subject, are referred to the Appendix to this Article.

Now for the American evidence, that this Gooseberry Sawfly found in the East, is not an indigenous, but an imported species. No notice whatever of any such insect is to be found in the writings either of Dr. Fitch or of Dr. Harris, whence we may reasonably infer that, at the time when they wrote, no such insect was known to infest the Garden in the Eastern States. Mr. Bigelow says that it was first noticed in Onondaga County, N. Y., about A. D. 1862. (*Ibid.*) In 1864 Prof. Winchell, not at all suspecting that it was an imported species, named and described it as occurring at Ann Arbor, Michigan, in a newspaper Article which was reprinted in *Silliman's Journal*, (Sept. 1864, p. 291,) under the specific name of *ribis;* but by an oversight, very pardonable in one who was not a professed entomologist, referred it to the wrong genus, *Selandria*. Unless my memory fails me, Mr. Brackett of Maine has also described this same insect, but under another specific name, as occurring in the State of Maine. Finally I hear from Dr. W. M. Smith of N. Y. that "Mr. F. W. Collins, of Rochester, N. Y. thinks that the Gooseberry Sawfly was undoubtedly introduced at Rochester, N. Y., by nurserymen in importations of bushes from Europe," and that he "knows that it has gradually spread from Rochester, as a centre, in gradually widening circles." And I learn from other sources, that in that part of the State of New York it has now become an awful pest. Hence, putting all the facts together, we may conclude that this Sawfly was imported from Europe within the last five or six years, perhaps in more than one place at once, and that it is now slowly overspreading the whole country. It was only the other day that I heard from a correspondent in Wisconsin, that his currant bushes had been attacked by a new kind of worm, that none of the neighbors had ever seen or heard of before. I may add here that Onondaga County, where both Dr. Smith and Mr. Bigelow reside, lies some 70 or 80 miles to the east of Rochester, and that Rochester is celebrated all over the United States for its very excellent and extensive nurseries.

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[*] Kirby and Spence speak of "the Sawfly of the currant and gooseberry" as one and the same species. (Kby. and Sp. *Introd.* Letter 6.)

I find in the *New York Tribune*, (July 27, 1866) the following statement which is apparently copied from the *Pittsburg Gazette*. It evidently refers to this same insect, and confirms the conclusion arrived at above. As to these worms ever "desisting and disappearing," that is very problematical. They may, and probably will, be worse some years than others; but wherever they have established themselves, there they will remain, in all probability, for ages and ages. The currants of infested bushes are likely enough unwholesome, but they can scarcely be "poisonous."

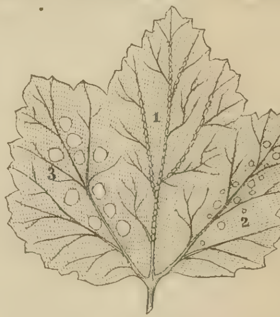
> In the northeastern counties [of Pennsylvania] a worm has destroyed the currants, by rendering them poisonous; in multiplied instances killing the bushes. This pest was imported from England four years ago, by Barry and Ellwanger of Rochester, N. Y., on a lot of gooseberry bushes. It is about three-quarters of an inch long. It multiplies its progeny almost incredibly. These worms attack the leaves, which they entirely devour. By reason of the destruction of the foliage the fruit becomes unfit for use. These worms travel more than a hundred miles a year, and will probably plague the country before they desist and disappear.

The mode in which this insect has been transmitted, first from the European nursery to the American nursery, and afterwards all over the the country, may be easily explained. As has been already stated, it passes the autumn and winter in the ground under the bushes where it has fed, housed in a little oval cocoon from ¼ to ⅓ inch long. Hence if, as often happens, bushes are taken up in the autumn or early in the spring with a little dirt adhering to their roots, that dirt will likely enough enclose a cocoon or two. A single pair of cocoons, if they happen to contain individuals of opposite sexes, will be sufficient to start a new colony. The first and probably the second year the larvæ will not be noticed; but increasing, as almost all insects do, unless checked from some extraneous source, in a fearfully rapid geometric progression, by the third or fourth year they will swarm, strip the bushes completely bare of their leaves, and ruin the prospect for a good crop of fruit. Of course, like other winged insects, they can fly from garden to garden in search of a suitable spot whereon to deposit their eggs; so that any point where they have been once imported becomes, in a few years, a new centre of distribution for the immediate neighborhood.

Nurserymen and all others, importing Gooseberry and Currant bushes from a distance, should be particularly careful, before they plant them, *to wash the roots thoroughly in a tub of water, and burn or scald whatever comes off them.* By attending to this precaution the dessemination of this mischievous little pest, throughout the United States, may be greatly retarded for many years to come. For those who are already cursed with it, I cannot do better than to copy the very sensible directions of Mr. Bigelow:—

> Remedy.—Dig up all the bushes that cannot be personally attended, and trim the remainder so as to leave them open and accessible. Visit them at least once every day. Look for leaves with little holes in them. The little holes indicate the presence of the newly hatched worms, which are not seen unless the leaf is turned up, as they always begin on the under side. By destroying four or five leaves on each bush per day the whole may be saved, as only a few leaves are selected by the fly to deposit her eggs. The worms never touch the fruit, and the stripping of the leaves does not prevent a new growth the same season, but these will no sooner appear than they are destroyed."

In the annexed figure, which has been drawn from specimens kindly furnished to me by Dr. Smith of New York, the portion of the currant leaf marked (1) shows how the eggs are laid by the mother-fly on the under surface of the leaf along the principal veins. That marked (2) shows the "little holes" spoken of by Mr. Bigelow as bored by the very young worms; and that marked (3) the holes bored by larger larvæ. It is evident that such holes may be readily recognized, and the leaf, along with the minute larvæ upon it, carried far away from any currant or gooseberry bushes and left to wither there, or---to make assurance doubly sure---thrown into the fire. If, however, the young larvæ are removed a few rods away from any plant belonging to the botanical genus *Ribes*, (Currant and Gooseberry,) they will be sure to die of starvation. For they cannot feed on anything else, any more than a Locust-borer can live in an Apple-tree.



There is a very similar worm, which has long been known to infest Currant and Gooseberry bushes in the East, and which is not an imported, but a Native American insect. But it may be distinguished at a glance from the larva of the Gooseberry Sawfly by its being what is popularly called a "Span-worm" or "Measuring-worm" or "Looper," having only ten legs, whereas our larva has twenty legs, and never "loops" as it walks. Like all other "loopers," this worm produces, not a four-winged fly, belonging to the Order Hymenoptera, but a moth or miller, belonging to the Order Lepidoptera, which has been called by Dr. Fitch, who first described it, "The American Currant-moth (*Abraxas? ribearia*)."

THE NATIVE AMERICAN GOOSEBERRY SAWFLY.

But besides this imported Sawfly I have recently discovered that there is an indigenous species in the Valley of the Mississippi which feeds on the Gooseberry and Currant, but which differs from the other one in the following respects:—1*st*. It belongs to a different genus—*Pristiphora* instead of

Nematus. The genus *Pristiphora* is chiefly distinguished from *Nematus* by always lacking what is technically termed the 1st submarginal cross-vein in the front wings of the perfect insect, so that, instead of *four* submarginal cells there are only *three*, the first very large. In the genus *Euura*, which is likewise closely allied to *Nematus*, there are also only three submarginal cells, but there it is the *second*, not the *first*, submarginal cross-vein that is lacking, so that the first submarginal cell, as in *Nematus*, is quite small. 2*nd*. The body of the larva is always green, and never bears the numerous black spots which, except after the last larval moult, always characterize the larva of the imported species. 3*rd*. The larva never goes underground to spin its cocoon, but constructs that cocoon among the twigs and leaves of the plant on which it feeds. 4*th*. The winged insect of the second brood comes out the same season, instead of lying underground all the winter in the pupa state, so that it cannot of course lay its eggs upon the leaves, but must necessarily lay them upon the twigs of the infested plant. Otherwise, if it laid them upon the leaves in September, which is the month in which the fly of the second brood appears, the eggs would be scattered to the four quarters of the compass, along with the leaves, far away from the infested bushes, at the fall of the leaf, and the young larvæ would starve when they hatched out next spring, and the species soon become extinct. Hence, in the case of this species we cannot apply the method of counterworking the other one recommended by Mr. Bigelow. For I particularly observed that the very young larvæ were not gathered in numbers upon one particular leaf—as in the imported species—but were distributed pretty evenly over the whole bush. Neither did they bore the similar holes through the leaf, which render the other species so easy of detection when young. 5*th*. The insect is but ⅔ the size of the other in all its states.

The first brood of this species I found had swarmed in prodigious numbers on some gooseberry and currant bushes, in Davenport, Iowa, about the end of June and beginning of July, 1866, so as to strip them almost completely bare. The owner of the bushes stoutly maintained that all the damage had been done *in three hours' time ;* but that of course was a mistake, for the larvæ must have been feeding there, as I afterwards ascertained, for at least two weeks. His gardener, shortly before I visited him, had syringed the bushes thoroughly with a wash composed of whale-oil soap ; and as the larvæ had all disappeared, with the exception of one or two individuals, he was strongly of opinion that they were all killed, horse, foot and dragoons. I told him that in all probability they had merely retired to spin up, and that he would have a second brood of them to afflict his bushes, shortly after the winged flies had appeared and laid their eggs for the second brood. In the middle of August I again visited these bushes, and just as I had anticipated, found a very plentiful supply of very young larvæ on them—enough, I should say, to strip them a second time of their leaves. From these larvæ I succeeded in breeding large numbers of the perfect insect, the description of which, as well as of the larva, is here subjoined.

PRISTIPHORA GROSSULARIÆ, new species. A black, four-winged fly, about the size of a common house-fly, the males and females not perceptibly different at first sight.

Female. Body shining black, with fine, rather sparse punctures. *Head* with the entire mouth, except the anterior edge of the labrum and the tip of the mandibles, dull luteous. Labrum transverse and very pilose. Clypeus short, squarely truncate, immaculate. Antennæ ⅔ as long as the body, joint 3 three and a half times as long as wide, joint 4 fully ¼ shorter than joint 3, 5—9 very slowly shorter and shorter; brown-black above, beneath dull luteous, except joints 1 and 2, which are black, tipped below with luteous. *Thorax* with the wing-scales honey-yellow and the cenchri whitish. *Abdomen* with the basal membrane whitish; ovipositor honey-yellow, its sheaths black. *Legs* honey-yellow, or sometimes pale luteous, with the six tarsal tips, and in the hind legs sometimes the extreme tips of the tibiæ and of the tarsal joints 1—4, pale dusky. *Wings* subhyaline, tinged with dusky; veins black; costa honey-yellow; stigma dusky, edged all round with honey-yellow, especially below. In a single wing of two females only out of forty-nine, the first submarginal cross-vein, which in this genus is normally absent, is quite distinct; and in a single wing of five other females, traces of it are visible on holding the wing up to the light. Length ♀ .17—.21 inch. Front wing ♀ .19—.23 inch. Expanse ♀ .41—.45 inch, (wings depressed.)

The *male* differs from the female only as follows :—1*st*. The antennæ are a trifle longer, and as usual vertically more dilated, joint 3 being only 2½ (not 3½) times as long as wide. 2*nd*. The coxæ, except their tips, and the basal half of the femora, are black; and in the hind legs the extreme tip of the tibiæ, and all but the extreme base of the tarsus, are dusky. Anal forceps honey-yellow. Length ♂ .17—.18 inch. Front wing ♂ .17.—19 inch. Expanse ♂ .35—.38 inch, (wings depressed.)

Described from four males and forty-nine females, bred September 2—12 from larvæ found on the cultivated gooseberry. I have also a single female in my collection which was captured at large in the woods; whence I infer that this insect feeds also on the wild gooseberry and currant. In this captured female the last submarginal cross-vein is only partly developed, and, as is in one or two of my bred females, the hind middle cell of the hind wing is absent. This is the first species of the genus *Pristiphora* hitherto described as North American. Stephens mentions eight species as found in England, none of which are said to feed on gooseberry or currant.

Larva. A pale grass-green worm, about ½ inch long, without any black dots on its body, and with a black head ; after the last moult the head becoming principally green.

Immature larva. Length not quite reaching ½ inch. Body pale green, with a rather darker dorsal line, and a lateral yellowish line above the spiracles, the space below which line is paler than the back. Anal plate and prolegs immaculate. Head black, not hairy. Legs brown, except the sutures.

The mature larva measures ½ inch in length, and differs in the head being pale green, with a lateral brown-black stripe commencing at the eye-spot and more or less distinctly confluent with the other one on the top of the head, where it is also more or less confluent with a large central brown-black spot on the face. The legs are also green, with a small dark spot at the exterior base of each, and a similar spot or dot before the base of the front legs.

Described from forty larvæ of various sizes, four of which spun up August 26, and the others within the next week. These larvæ were taken off the bushes August 12, at which date they were mostly about ⅛ inch long. I have little doubt that it is to this same insect that Mr. Huron Burt of Missouri refers, when he says that the gooseberries and currants in his neighborhood were all destroyed in 1865 by a "green worm." (See PRACTICAL ENTOMOLOGIST No. 11, p. 114.) If it had been the imported species, he would surely have spoken of the black dots or spots, which catch the eye at once in that larva. With the above two exceptions, and possibly the case in Wisconsin referred to above, it does not appear to be on record, that this indigenous species has ever occurred on anybody's bushes in such numbers as to attract attention. Yet that it has existed in the Valley of the Mississippi, and possibly in the Eastern States, for time immemorial, there can be no manner of doubt. For there is no species of the genus *Pristiphora* known to infect Gooseberry and Currant bushes in Europe; and consequently it could not have been imported therefrom into the United States.

Having procured all the above larvæ when they were so very small and young, that they could scarcely have been as yet attacked by parasitical insects, I am unable to say anything as to what particular species of parasites may check and control the undue multiplication of this species. But from the fact that this sawfly is so seldom noticed as a noxious insect, I should infer that there must be at least one indigenous Parasite that makes effective war upon it. In the case of Mr. Huron Burt's species—which I suppose to be the same as this—the insect seems to have been almost entirely extirpated, from some cause or other, for at least two successive broods.

On the one hand, then, we find a native-born American Sawfly, feeding on gooseberry and currant bushes, which has existed in the United States ever since the country was first settled up by the white man, yet was never noticed by any one, so far as I can find out, as a noxious insect till the year 1865, and then merely in a few scattered localities. On the other hand we have a European Sawfly, feeding on gooseberry and currant bushes, which has only been introduced into the United States five or six years, and then merely in small numbers, and yet has already almost put a stop to the cultivation of these plants in a large district of country in the State of New York, and is slowly but surely spreading in all directions---ruining the gooseberry and currant bushes wherever it goes, unless the greatest pains be taken to counterwork it. What is the cause of such a remarkable difference? Why, of two Sawflies feeding on the very same plants, and belonging to two closely allied genera, should one be comparatively innocuous and the other be a pest of the most destructive character? It is because the first belongs to the old-fashioned and less highly improved American Creation, and the last to the new-fashioned and highly developed Creation of the Old World. In every department of Organic Life the same law holds good. The White Man slowly but surely is sweeping the Red Man from off the face of the earth. The European Horse and the European Horned Cattle now roam in vast herds over large districts of America, where the more puny denizens of the soil were formerly the undisturbed sovereigns. Various species of European insects are slowly but surely following in the train of the White man, and occupying those places in the Scheme of the Creation which were formerly occupied by indigenous American species of weaker and less energetic constitutions. And even in the vegetable Kingdom, the robustly constituted plants of the Old World are slowly but surely overspreading America; and the daisy, the toad-flax, the purslane, the Jamestown weed, (Gympson weed), the pig-weed, and a host of others are gradually seizing hold of roadside and ploughed land and pasture fields with silent but irresistible force.

Dr. Fitch has observed that no American plant-feeding insect attacks the toad-flax (Linaria vulgaris), a European weed, which, as it appears, terribly infests many pasture-fields in the State of New York; and has speculated on the propriety of importing some of the European insects that are known to feed on it in its native country. He has also advised the importation of some or all of the three parasitic insects that check and control the excessive multiplication of the Wheat Midge in Europe. But we should not stop here. The principle is of general application; and wherever a Noxious European Insect becomes accidentally domiciled among us, we should at once import the parasites and Cannibals that prey upon it at home. Nobody can doubt that if the Lion and Tiger and Leopard of the Old World were imported into South America and allowed to increase and multiply there, they would greatly check the multiplication of the Horned Cattle and Horses that now range wild over the vast Pampas of that country, although our more puny American *Felidæ*, the Puma and Jaguar and Cougar, are unable to do this. And on the same principle, if we wish to fight effectually against those noxious insects which have been introduced among us from Europe, we must fight them by the instrumentality of the strong and energetic foes that make war upon them in their own country. To attempt to fight them with the poor old-fashioned indigenous Cannibals and Parasites of America, is like sending out a fleet of old-fashioned wooden ships to oppose a fleet of ironclads.

APPENDIX.

After an attentive study of a valuable Paper by M. Léon Dufour of France on the Sawflies of the Gooseberry and Currant, (*Annal. Soc. Ent. France*, 2nd ser. V. pp. 571—581,) I incline to the conclusion that there are but *two* species infesting these plants in Europe—and not *three* as is maintained by M. Dufour—and that it is the second of these which has been introduced among us. Here follows their synonymy, with my reasons for the conclusions arrived at. It will be observed that the two insects belong to distinct genera, and that our species, having been first described in the year 1819 by Klug, must, according to the law of priority, retain his specific name and be designated as *Nematus ventricosus*, Klug.

I. **Tenthredo ribis** Schrank. Quoted by Dahlbom *Clav. hymen. system* p. 36. Said by Dufour (p. 576) to belong to the genus *Coryna* of St. Fargeau, which is a pre-occupied synonym of the subgenus *Tenthredo* of Hartig. (See Brullé *Hymen.* p. 664.) Larva unknown to Dahlbom.

The larva of what is apparently the same insect, though Dahlbom refers it to his *Nematus grossulariæ*, is figured by Reaumur (V. p. 94 and Plate 10) as *La fausse chénille du groseillier* (the false caterpillar of the currant and gooseberry), and is described as 22-footed, (like the larvæ of most *Tenthredo,*) and as having no hairs proceeding from the black tubercles always found on the body before the last larval moult. See Dufour, p. 576.

II. **Nematus** [*tenthredo*] **ventricosus** Klug, *Berlin Magazin,* A. D. 1819. The perfect insect only described? Quoted by Snellen von Vollenhoven *Zijdscrift Entom.* 1859, as the authentic name of the species, the larva of which was in 1834 described by Bouché. Overlooked by Dufour.

Nematus [*tenthredo*] *affinis* St. Farg. ♂ and *Nematus* [*tenthredo*] 3-*maculatus* St. Farg. ♀, *Monogr. Tenthr.* p. 69, A. D. 1823. Evidently described from the perfect insect only. Quoted by Dufour as identical with his species.

Nematus [*tenthredo*] *ventricosus* Klug. The larva is described by Bouché *Naturg. Inseckt.* p. 140, A. D. 1834, as bristly and with black tubercles, the dorsal ones "mostly on each segment in three transverse rows." His description evidently applies only to the larva before its last larval moult, after which it always, or at all events often, loses the tubercles and hairs and becomes entirely green; for he gives the length of the larva as only seven lines. It is said to swarm upon both Currant and Gooseberry bushes. Entirely overlooked by Dufour.

Nematus grossulariæ Dahlbom. (l. c.) A. D. 1835. Larva said to be 20-footed, and with hairs proceeding from the dark tubercles always found on the body before the final moult. Also said to change to green after the last moult. On Gooseberry. Quoted by Dufour.

Nematus grossulariatus Dahl. (*Ibid.*) Also on Gooseberry. Supposed by Dahlbom to be a distinct species, although he says himself that the perfect insects are as like as one egg to another, merely because the larva spins its cocoon on the leaves of the infested plant, instead of going underground to do so. M. Dufour found some of his larvæ to do the very same thing, although they all produced the same imago. (pp. 572—3.) Hence he very justly infers that *grossulariatus* is a mere synonym. We might as well make two species of the Wheat-midge (*Diplosis tritici* Kby.), because some few of the larvæ construct their cocoons in the ear of the wheat, instead of going underground for that purpose.

Nematus ribesii Stephens, *Ill. Brit. Ent. Mand.* VII, p. 32. A. D. 1835. Description very imperfect, the larva not being described, and nothing being said as to which sex of the perfect insect is described. On Red Currant. Entirely overlooked by Dufour.

Nematus ventricosus Klug. Hartig Aderfl. Deutsch. I, p. 196, A. D. 1837.

Nematus ribis Leduc, *Mem. Soc. Sc. Natur. Seine-et-Oise* II, Plate 1, fig. 5, Plate 2, figs. 1—2. A. D. 1846? On White and Red Currants. Quoted by Dufour.

Nematus ribis Leduc apud Dufour, l. c. A. D. 1846. On Red Currant. M. Dufour describes the larva before its last larval moult so as to agree exactly with Bouché's description, except that Bouché says nothing of the anal plate being black. In particular he says that "each segment has *three* rows of black tubercles transversely arranged;" (p. 574;) which, by the way, is not strictly true of the three thoracic segments in our New York species.

M. Dufour assigns the following reasons (p. 577) for believing his *Nematus ribis* to be distinct from Dahlbom's *N. grossulariæ:* 1*st.* He says that his larva lacks the two anal prolegs and is 18-footed, not 20-footed. But he allows (p. 574), that there is a bilobate projection on the anal segment, which is used by his larva to walk with, and this is about all the anal proleg that I have seen on any *Nematus* larva. 2*nd.* He finds in his larva, before its last larval moult, a dark plate with pointed angles on the dorsum of the last segment, which Dahlbom says nothing about. As this plate is expressly said to disappear afterwards, it might likely enough have escaped Dahlbom's notice. It is very obvious in our American New York larva. 3*rd.* Dahlbom describes the tubercles on his immature larva as piceous-black, and Dufour says they are coal-black in his. This is splitting hairs with a vengeance. 4*th.* Dufour finds no trace in his larvæ of a dorsal green line described as existing in Dahlbom's larvæ. The ground-color of the larvæ being pale green, and "the middle tubercles on the back forming two rows," as Bouchè correctly states in his description, this is scarcely worth talking about. 5*th.* Dufour says that there is a notable difference in the distance between the eyes of the two larvæ, (*une différence notable de taille entre les yeux.*) This is probably based upon Dahlbom's figures, which may be not perfectly correct. 6*th.* Dahlbom's larva fed on the Gooseberry and Dufour's on the Currant. But our American insect, as has been shown above, feeds indiscriminately upon both plants; and Bouché expressly states that *ventricosus* Klug occurs "in two generations in May and then again in July and August, *on Gooseberry and Currant bushes,* which they often eat up almost entirely." 7*th.* Dahlbom describes the cocoon of his species as having an external envelop of thin network. Dufour can see in his cocoon only "filaments which seem to cross one another on its flanks to fix it to its place." (p. 579.) This is a distinction almost without a difference. As regards the perfect insects, it is not stated that there is any difference whatever.

M. Dufour contends that descriptions must be rigorously interpreted, without making any allowance for variations, whether geographical, phytophagic or otherwise, or for possible oversights or inaccuracies in the describer. But that even M. Dufour himself is sometimes inaccurate, may be inferred from the following facts:—1*st.* He describes the wing-scales of his insect as "black" and the ground-color as "luteous or luteo-rufous;" (p. 579;) whereas it is contrary to the general law of coloration in *Tenthredinidæ,* that the wing-scale should ever be black except where the body is almost entirely black. In our American insect it is luteous in both sexes always. 2*nd.* He says that in his larva the abdominal prolegs "occupy the six segments which follow those of the thorax;" (p. 574;) whereas in all Tenthredinidous larvæ, even in those which are 22-footed, the segment immediately behind the thorax is always destitute of prolegs.

Nematus [*Selandria*] *ribis* Winchell. *Am. Jour. Sc. Arts,* Sep., 1864, p. 291. Like Bouché, this author in his description has entirely overlooked the normal or occasional change in the larva, after the last moult, from green dotted with black to pure green, and like Dufour and Stephens, he states that it feeds on the Red Currant, without being aware that it also feeds on the Gooseberry.

[From a Letter from Isaac Hicks, N. Y.]

We want your Paper to go ahead, so as to expel all such errors as boring into trees and putting in sulphur. In 1860, having heard of this sulphur humbug, and thinking it would be but little trouble to try the experiment, I bored about six half-inch auger holes into my peach trees. Well, they lived a few years, bore a few peaches, and the effects of the Curl and Yellows soon sent them to the woodpile. One day my man called me in great earnestness to come there quick to the woodpile; he had something wonderful to show me. And sure enough he had been cutting up the trunks of my unfortunate peach-trees, and had come across the auger-holes made four or five years previously and filled with sulphur. It was perfectly incomprehensible to him, how that yellow stuff ever got there. Now, as these trees lived several years after they had been bored and the holes filled with sulphur, and as the sulphur was still there when they were cut up for fuel, it is plain that the sap cannot take up the sulphur and carry it away, out of the auger-holes in which it was originally placed, into the branches, twigs and leaves; which is assumed to be the case by the believers in the "Sulphur-cure."

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—ASSOCIATE EDITOR.

W. H. R. Lykins, Kansas.—I can add nothing to what I have already said respecting the Borers of the Peach and of the Locust in No. 4 of the PRACTICAL ENTOMOLOGIST (pp. 27—29). The fact of the Locust Borer having already in 1865 travelled as far westward as Lawrence, Kansas, is very interesting. You say that "many of your farmers are digging up their Locust trees, believing that they are the cause of the Peach trees being infested with Borers." They might as well kill off their sheep, believing that rats and mice are generated on the sly in the night time by the old ewes. Tell them to put that nonsense out of their heads. The small thread-like white larvæ, which were "taken out of a mass of hard frozen gum last March," from a Peach tree infested by Borers, are the larvæ of a two-winged fly which preys on decaying vegetable matter, and probably of some species of the genus *Ortalis*. As you may notice, they have no legs at all; while the larva of the true Peach Borer has always sixteen legs, no matter how young it may be. Your specimens reached me in first-rate order.

C. P. Wickersham, Penna.—Thanks to your good packing, the larvæ of the Wheat Midge, "taken from the screenings of wheat after passing through the thrashing machine," arrived in excellent order. You say that about one-half the wheat crop has been destroyed in your neighborhood in 1866 by this insect. This agrees with what I hear from other quarters, not only in Pennsylvania, but in Maryland. Many of the specimens sent are enveloped in what you and Dr. Harris consider as the "skin" of the insect undergoing the process of being moulted, but what I and all European authors consider as its cocoon. The real truth of the matter is, that if you wound or break this "skin" or "cocoon"—call it which you will—the enclosed larvæ will often crawl out of it; otherwise not. That this is really so, you or any other man can easily satisfy himself by experiment. Hence it follows that Harris must be in error here. If you refer again to Harris's book, you will see that his theory was based, not upon observations made personally by himself, but upon facts reported to him by a very estimable lady, who, however, never pretended to any knowledge of Entomology. I have discussed this whole subject very fully in the *Proceedings*, &c.; (III, pp. 568—570;) but this is not the proper place for controversy.

Marion Hobart, Ill.—The black cricket you send is a male of our common *Acheta abbreviata* in the pupa state. In the perfect state the wing-cases are as long again, and the insect is larger. The female may be readily distinguished, either in the pupa or perfect state, by having a long bristle-shaped ovipositor projecting behind. For one of these crickets that you find in houses, you will find a thousand in the woods and fields. Our true American house-cricket is of a dull clay-yellow color, and does not occur to the north of Maryland. All the crickets feed indiscriminately both on animal and vegetable substances. I have repeatedly noticed *abbreviata* under dead putrid birds, &c. Even the Catydids sometimes eat insects; for I have caught several species with flies in their mouths, which they were munching up. Closet-naturalists, copying from one another's books and scarcely ever opening the Great Book of Nature, usually tell us that all the Orthoptera, except the family of the Camel-crickets (*Mantidæ*), are exclusively vegetable feeders. But even the Grasshoppers, which are the most so, have been known in Minnesota, where they are sometimes so numerous as to do great damage, to eat woollen clothes off the fences.

The light green insect, which you say you found feeding upon plant-lice, is the male of *Œcanthus niveus*, or the tree-cricket. Both this and the preceeding belong to the *Acheta* family of the Order Orthoptera. The larva is shaped like the perfect insect, but has only the merest rudiments of wings, and when first hatched out none at all. The fact of this insect feeding on plant-lice is new and important. The males make a loud shrilling noise in the night and often fly into houses, but are too noisy to be agreeable inmates in a bedchamber.

E. Gridley, Lake Co., Ill.—The insect "found feeding greedily on your potato-vines" is the larva of the terrible New Potato-bug, respecting which see my Article in No. 1 of the PRACTICAL ENTOMOLOGIST.

L. W. Taylor, N. Y.—The slender, long-legged insect, about three inches long, which you send is the *Spectrum femoratum* of Say, a female. The male is of a shining pale mahogany color and has a forceps at the tip of its tail. It belongs to the *Phasma* family in the Order Orthoptera, and is remarkable for never acquiring wings, or even any rudiments of wings, in either sex. There are foreign species which have wings, and which have the legs expanded so as to resemble leaves, whence they have been called "Walking-leaves;" and some old authors actually believed that the leaves of trees changed into these insects, and then dropped off and commenced walking about. Our species is sometimes called in English "Walking-stick" and sometimes "Prairie alligator," which is a poor name for it, because it lives in the woods and not on the Prairie, feeding on the leaves of the trees it inhabits. It is perfectly harmless and may be handled without fear. I have handled thousands of them, and never knew one even attempt to bite, as Grasshoppers will sometimes do.

H. B. Beegle, N. J.—*1st.* The bunch of eggs on the twigs of your apple-trees is that of the common "Caterpillar" of the Apple-tree, (*Clisiocampa americana*). Respecting these see the Answer to Marion Hobart in No. 10 of the PRACTICAL ENTOMOLOGIST, p. 101. For every one of these that you destroy, you destroy a future "caterpillar" nest. *2nd.* The smooth chrysalis about an inch long, suspended by its tail to the apple-tree twigs, and with a curious projection like a large roman nose on the middle of its back, is the pupa of *Limenitis ursula*, a large and handsome butterfly of a blue-black color, with orange spots, but without any tail to its wings. The books say that its larva feeds on willow, cranberry and cherry. I have bred it from plum, and now you find it on apple. The larva is mostly olive-green with two sprangling horns behind its head. *3rd.* The oval larvæ, ¾ inch long, with thick-set evenly-shorn short hairs, white when young and brown when full-grown, belong to *Lagoa opercularis*—a cream-colored moth with the basal portion of its front wings covered with curly wool, which is marked more or less with rusty black. It is a very variable species, and Dr. Packard has described a variety of it bred from the blackberry as *Lagoa crispata*. I have bred it from the Sycamore or Buttonwood, and Dr. Fitch enumerates it as among the insects found on the plum. Your finding it on the apple is apparently a new fact. It is a very rare insect in Illinois, and I believe generally so. The moth will not appear till next summer, and the larva makes a tough oval silken cocoon, which it attaches to a twig of the tree on which it feeds. If you find any of these on your trees, please send them all to me, even if there are a score of them, cutting off a small piece of the twig along with each.

Walter Riddell, Canada West.—The small red mites, about the size of the head of a pin, which you find attached in great numbers to the wings of grasshoppers, have long been known to me; but, so far as I am aware, they have never been named or described. They are allied to the genus *Uropoda*, a species of which attaches itself by the tail to the bodies of certain dung-beetles in Europe, but differ in attaching themselves, not by the tail but by the head, and in the front pair of legs being not only exceedingly small, but so small that I cannot distinguish them at all, so that the animal is apparently six-legged, like a true louse. Yet the general characters are those of the Mites. Most mites, indeed, when in the larva or immature state, have only six legs; but all that I have examined of your species are apparently in the perfect state. Not improbably it may belong to Latreille's genus *Astoma*, a European species of which is said to be parasitic upon Flies and other insects, and which has only six legs. In that case it may be called *Astoma locustarum*, as it is distinct from the European species by the body not being at all constricted in the middle. I have never found more than eighteen or twenty of them on one grasshopper, and do not believe that twice that number would have any material effect on the health of the insect. The grasshopper you send is the common Red-legged grasshopper—*Caloptenus femur-rubrum*. A species differing from this, only in the wings and wing-cases being always a great deal longer than the body, and named *spretus* by Mr. Uhler, is the insect that does so much damage in Colorado and probably also in Minnesota.

☞Several Answers lay over for the next number.

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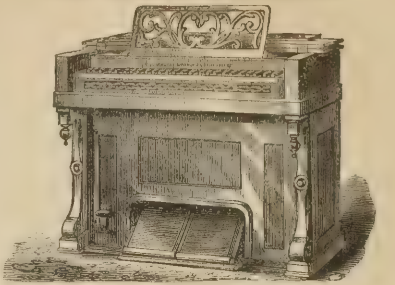

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INDEX TO VOLUME II.

PAGE.

A groundless fear, 95
A new foe to the Corn, 117
Another Humbug, 35
Another Universal Remedy, 69
Answers to Correspondents, 7, 20, 33, 47, 55, 71, 83, 96, 102, 107, 118
Anthonomus 4-gibbus, 80
Anthonomus prunicida, 79
Aphis mali, 116
Aphis ribis, 106
A Plant growing out of an Insect, 116
Apple-worm, 115
Apple-tree Bark-lice, 81, 116
Apple-tree Insects, 92
Apple-tree Tent Caterpillar, 117
Army-worms. The three so-called, 111
Ash-gray Blister-beetle, 26
Aspidiotus conchiformis, (Illustrated,) 31, 81
Bag-worms, 53
Bark-lice on Pear-trees, (Illustrated,) 30, 31
Bark-lice on Apple-trees, 81
Basket-worms, 53
Beetles destroying Corn, 20, 117
Birds *versus* Insects, 44
Black Blister-beetle, 26
Black-knot, 63
Bogus Thrips, (Illustrated,) 49
Borers.—The Plug-ugly Theory, 69
Bud-worms, 66
Canker-worm, 6, 16, 89
Cantharides, (Illustrated,) 30
Carpocapsa pomonella, 115
Cedar Apples, 62
Change of Name, 61
Chilocorus bivulnerus, (Illustrated,) 32, 41
Chrysopa, (Illustrated,) 42
Clisiocampa americana, 117
Coccinella 9-notata, (Illustrated,) 41
Coccus? Harrisii, (Illustrated,) 31

PAGE.

Colaspis flavida, (Illustrated,) 68
Colorado Potato Bug, (Illustrated,) 13, 101, 116
Common Curculio and its Allies, 75
Confessing the Corn, 82
Conotrachelus nenuphar, 75
Corn Sphenophorus, 117
Critic criticized, 58
Cucumber Bug, 5
Curculio, 30, 75, 114
Currant Plant-lice, 106
Cut Worms, 64, 67, 94
Destruction of Insects, 93
Destruction of Insects in the Soil, 30
Doctoring Fruit Trees, 20, 67
Do Cut-worms destroy Tree-buds? 64
Do Hogs destroy Grubs? 90
Drop Worms, 53
Enemies of the Plant-lice, (Illustrated,) 41
Enemies of the Rice Crop, 89
Entomology run mad, 66
Ephemeron or May-fly, 95
Epilachna borealis, (Illustrated,) 42
Erythroneura vitis, (Illustrated,) 51
European Parasites. Importing 54
Evergreens as a Harbor for Insects, 31
Fertilizing Plants, 110
Fidia viticida, (Illustrated,) 87, 88
Fighting the Curculio, 71
Fire-blight, 7, 96
Four-humped Curculio, 80
Friends of the Plant-lice, (Illustrated,) 39
Golden-eyed Flies, (Illustrated,) 42
Gooseberry Sawfly, 67, 116
Grape-leaf Gall-Coccus, 17
Grape-vine Colaspis, (Illustrated,) 68
Grape-vine Fidia, (Illustrated,) 87
Grape-vine Flea-beetle, (Illustrated,) 50
Grape-vine Leaf-hopper, (Illustrated,) 51
Grasshoppers and Locusts, 1

PAGE.
Habits of the Tree Cricket, (Illustrated,) 54
Haltica chalybea, “ 50
Harris' Bark-louse, “ 31
Hessian Fly 7
Hippodamia maculata, (Illustrated,) 32, 41
Hop-growing in the West 70, 73
Imported Apple-tree Bark-louse, 81
Imported Gooseberry Sawfly, 67, 116
Imported Insects—The Onion-fly, (Illustrated,) 64
Importing European Parasites, 54
Insects in the Orchard, 30
Insects in the Soil. Destruction of 30
Iulus multistriatus, (Illustrated,) 34
Jumping to Conclusions, 74, 94
Klippart's Wheat Plant, 27
Ladybirds, (Illustrated,) 41
Lema trilineata, “ 25
Little Turk and its Crescent, 114
Locusts and Grasshoppers, 1
Lytta atrata, 26
Lytta cinerea, 26
Lytta marginata, (Illustrated,) 26
Lytta vittata, “ 26
Margined Blister-beetle, (Illustrated,) 26
Mass of Mistakes, 70
May Fly, 95
More Universal Remedies, 93
Nematus ventricosus, 67
New Potato Bug, 13, 101, 116
Nine-marked Ladybird, (Illustrated,) 41
None so blind as those who shut their eyes, 89
Northern Ladybird, (Illustrated,) 42
Œcanthus niveus, (Illustrated,) 54, 94
Old-fashioned Potato Bugs, “ 25
Onion Fly, “ 64
Oyster-shell Bark-louse, (Illustrated,) 31
Peach Worm, 110
Pear-tree and Apple-tree Insects, 92
Pemphigus vitifoliæ, 17

PAGE.
Plant-lice—Their Friends and their Enemies, (Illustrated,) 37
Plug-ugly Theory, 69
Plum Gouger, 79
Poisoning Noxious Insects, 52
Potato Bugs, (Illustrated,) 13, 25, 101, 116
Propellor Fly, 82
Quacks and Physicians, 95
Salutatory, 1
Scientific Nomenclature, 105
Scolytus. North American species of 58
Self-taught Entomologists, 91
Sphenophorus zeæ, 117
Spiders and Wasps in the Orchard, 31
Spindle Worms, 115
Spotted Ladybird, (Illustrated,) 32, 41
State Entomologist of Illinois, 111
Striped Cucumber Bug, 5, 20
Syrphus Flies, (Illustrated,) 43
Tettigonia vitis, (Illustrated,) 51
The Tent Caterpillar of the Apple-tree, 117
The three so-called Army Worms, 111
The True Curculio, 75
Thousand-legged Worms, 70
Three-lined Leaf-beetle, (Illustrated,) 25
Thrips, “ 49, 50
Thyridopteryx ephemeræformis, 53
Tree Cricket. Habits of. (Illustrated,) 54, 94
Tree Cut-Worms, 67, 94
Trimble's Insect Enemies of Fruit and Fruit-trees, 29
True Thrips and Bogus Thrips, (Illustrated,) 49
Twice-stabbed Ladybird, (Illustrated,) 32, 41
Universal Remedies, 52, 69, 93
Use of Natural History, 96
Valedictory, 111
Wheat Midge—Jumping to conclusions, 94, 99
Wire Worms, (Illustrated,) 61

ERRATA.

Page 9, column 1, line 1, for "chrysalises" read "four chrysalises."

Page 9, column 1, line 12, for "1—5 inch" read "1-5th inch."

Page 27, column 2, line 7 from bottom, before "6th, *Trogosita*" insert "5th, *Calandra* (*Sitophilus*) *granaria*, the Grain Weevil."

Page 35, column 1, line 15, for "1861" read "1867."

Page 50, column 1, lines 15 and 14 from bottom, for "flea-beetle, (*Haltica*)" read "snout-beetle, (*Apion*.)"

Page 56, column 2, line 35—36, for "I, p, 10," read "II, p. 10."

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PHILADELPHIA, OCTOBER, 1866.

SALUTATORY.

On assuming the editorial chair, it is usual to make a great many promises, which may or may not be kept hereafter. I shall not follow that example, further than to say, that I shall use my best endeavors to make the PRACTICAL ENTOMOLOGIST what its name professes it to be—a real, live, PRACTICAL Paper. Those who have already made my acquaintance through the columns of this Journal, have of course formed their own opinion of what I am able to do; and subscribers who are thus far strangers to me, if they are as wise as I take them to be, would not be influenced by a whole gasometer of windy promises from an unknown individual.

What little I have hitherto done for the PRACTICAL ENTOMOLOGIST, has been done without any pecuniary benefit to myself, and solely with the object of furthering the interests of science, by proving to the people, that scientific truths are often of real, practical, dollars-and-cents utility. Whether my present position will be continued beyond the current year, will depend principally upon whether the American people endorse my poor efforts for their benefit by subscribing liberally to the PRACTICAL ENTOMOLOGIST. BENJ. D. WALSH.

GRASSHOPPERS AND LOCUSTS.

Shakspeare has said that "a rose by any other name would smell as sweet," and I suppose that, by parity of reasoning, he would infer that "a skunk by any other name would stink as strongly." But Shakspeare was a poet, not a philosopher. There is a great deal in a name. Call any given kind of caterpillar the "Army-worm," and people are immediately alarmed about it, and fancy that it is going to sweep the whole country before it. Tell them of a swarm of "grasshoppers" alighting from the clouds in any country, and it excites but little attention. But call the very same insects "a devouring swarm of locusts," and they immediately think of King Pharaoh and the desolated land of Egypt, and are filled with horror and apprehension.

Now, at this present moment, enormous clouds of what are, properly speaking, "Locusts," are ruthlessly desolating Kansas and Nebraska, and some of them even passing into Missouri. Yet, as the American people choose to call these insects "grasshoppers," and grasshoppers are quite common throughout the United States, nobody thinks much about it. In reality, however, the species which is doing the damage, as well as most of the insects popularly known as "Grasshoppers," belong to the very same family of Insects as the Locusts of Scripture and of modern Europe; though, as is the case with about 95 per cent. of the various insects found in North America, the species differs from any that occurs in the Old World. It is to Prof. W. S. Robertson, of the Indian Orphan Institute, Highland, Kansas, that I am indebted for specimens of the very insect which is now actually infesting Kansas, though more than a year ago I had been supplied with specimens of the same species taken by my friend Dr. Velie in Colorado. Singularly enough, this insect has never yet, so far as I am aware, been scientifically described; but as Mr. Uhler, without describing it, has given it the name of *Caloptenus spretus*, we may designate it in that manner. It differs from the common Red-legged Grasshopper, (*Caloptenus femur-rubrum,*) which occurs everywhere east of the Mississippi River in great abundance, chiefly in all the four wings being very much longer, so that, instead of flying only a few yards at a stretch, it can with ease fly a great distance. In a female specimen of the former, which I have measured, the wings expand from tip to tip $2\frac{2}{10}$ inches, and the front wing is 1.03 inches long; in a female specimen of the latter of exactly the same size they expand only $1\frac{3}{4}$ inches and the front wing is only 0.80 inch long. In the male sex the difference is not quite so great, but still it is sufficiently characteristic. And these differences are found to be constant and permanent, and not to occur in a few specimens only of each species, and to pass by insensible gradations from one species to the other. Hence, in spite of the almost absolute identity of all the other characters, we are bound to consider the two insects as distinct species. Whether they have always been thus distinct for all preceding time, is another and a very different question. According to Dr. Velie, who supplied me with specimens from Colorado, it is this same *Caloptenus spretus*, which often does great damage in that Territory; and there can be little doubt that it is the same insect which has from time to time invaded Minnesota. The name "spretus" means "despised," and refers apparently to its having been hitherto despised or overlooked by Entomologists. In fact, as before stated, I believe that this is the first occasion, on which it has been mentioned in print in such a manner, that it can be scientifically identified. We may call it in English "The hateful Grasshopper."

Before I proceed to recount the ravages of this "Hateful Grasshopper," it may be as well to state for the thousandth time, that the insects popularly called "Locusts" in North America have nothing whatever to do with the Locusts of Scripture and of modern Europe, and do not even belong to the same Order, or to the same grand group of Orders. The former are "Suckers;" the latter are "Biters." The former belong to the Order Homoptera; the latter to the Order Orthoptera. The former have their front wings glassy and transparent; the latter have them more or less leathery and opaque. The former have a mere apology for antennæ, which the general observer would entirely overlook; the latter have quite conspicuous and rather long antennæ. It is to the former that the so-called "Seventeen-year Locust" (*Cicada septendecim*) belongs; but, as the term "locust" gives rise to so much confusion, it would be better to drop it altogether and call this insect "the seventeen-year Cicada." It is remarkable that, although these American bogus "locusts" (or cicadas) are physically incapable of eating, seeing that they have no jaws to eat with, yet the earliest account we have of them asserts, that "they did *eat up the green things*, and made such a constant yelling noise as made the woods ring of them and ready to deafen the hearers." (*Morton's memorial.*) This is an amusing specimen of the slipslop way in which Natural History was written by our grandfathers, and of the influence of a mere name upon the imagination. The insect being popularly called a "locust," Morton naturally inferred that it must act like the "locusts" of which he had read in the Bible.

But insects are not the only animals, among which popular names have caused great confusion in America. In some parts of the United States a species of Grouse (Tetrao umbellus) is called a "partridge," and in other parts the Quail (Ortyx virginianus) is called a "partridge." And almost everywhere two entirely different mammals, the thirteen-striped ground-squirrel (Spermophilus 13-lineatus) and the Pouched Gopher (Geomys bursarius) are confounded under the common name of "Gopher." Nor are similar cases wanting in Europe. In many English counties sheep of a particular age are called "Hoggets," and often for the sake of brevity "Hogs;" and on one occasion a London gentleman was recommended by a neighboring farmer to turn thirty or forty "hogs" upon his lawn, in order to improve the grass. As the Londoner understood the word "hogs" to mean "swine," and adopted his neighbor's advice to the best of his own understanding of it, the result may be readily guessed. Quite recently, in a grave English work on Architecture, I met with a similar story, which the author vouches for as true. It seems that in the Brewers' business molasses is extensively used in England, and is technically known as "Spanish." Sifted coal-ashes are also extensively used for grinding up along with clay in the manufacture of bricks, near London, and are likewise popularly known among the brickmakers as "Spanish." On one occasion a London brewer, being about to build a large brick house in the country, sent a master brickmaker down there to report on the quality of the clay. The answer was that he could make first-rate brick with it, if he only had a load or two of "Spanish," meaning of course coal-ashes. Greatly surprised at such a demand, but having much confidence in the man, the Brewer forthwith sent off to the Brickmaker two cart-loads of "Spanish" in his own sense of the term, i. e. molasses. The result may be easily imagined.

After these preliminary remarks, I will now give such details as I have been able to collect respecting these destructive "grasshoppers," which ought by rights to be called "Locusts," but which, if designated by that name in America, would make as much confusion as the English sheep-grower's "hogs" or the English brewer's "Spanish." It should be understood, however, that some of the insects which gather in great swarms in California and Utah, sweeping everything green before them, and are confounded with the true "grasshoppers" under the same popular name, belong to a closely allied family, the Catydids, (*Gryllidæ* Leach, or *Locustariæ* Latreille,) and are mostly only furnished with very short rudimental wings. To this family evidently appertains the insect rudely figured in the *Smithsonian Report* for 1860, (p. 424,) as infesting the Shasta Valley in California, and it is not improbably the *Anabrus purpuratus* of Uhler, which Dr. Velie took abundantly in Colorado. The "Catydids" may readily be distinguished from the true "Grasshoppers," (*Locustadæ* Leach, or *Acri-*

dii Latreille,) by the female always having a long sword-shaped ovipositor projecting from the tip of her tail.

THE HATEFUL GRASSHOPPER IN MINNESOTA, 1856—7.

"For two years in succession—1856 and 1857—the grasshoppers destroyed our crops, and many resolved then to keep two years' supply of produce on hand afterwards. One fact I noticed: although they ate the bark from saplings, and consumed our corn, tobacco, &c., ate holes in clothes hanging out to dry, and destroyed boots and shoes when they lit on them in the house, yet peas they avoided, and it was an odd sight to see the field completely stripped, even of the weeds, and the pea-patch left undisturbed. There was no turning to the right or left with them; they went hopping on to the tune of John Brown, and they may be hopping yet for aught I know." (From a letter by O. H. Kelley, of Anoka Co., Minn., printed in the *Country Gentleman*, July 31, 1862.)

THE HATEFUL GRASSHOPPER IN NEBRASKA, 1866.

"In Nebraska the grasshoppers, according to the papers of Leavenworth, Kansas, had crossed Salt Creek and Weeping Waters, having come from the West, destroying everything in their course." (*N. Y. Sem. Tribune*, Sep. 25, 1866.)

"The grasshoppers, which have devoured everything about Fort Kearny, [Nebraska,] are rapidly approaching the River, and may yet sweep over Missouri. A few days ago they appeared in clouds at Seneca, Kansas, five miles west of St. Joseph, Mo. It is said that they will average one hundred to every square foot of surface." (From the *Boston Cultivator*, Sep. 22, 1866.)

The following is from the Nebraska correspondent of the *Rock Island Union*, and was printed in that paper September 25, 1866:--

NEBRASKA CITY, September 8, 1866.

COL. BARNES.—Fourteen miles north-west of Nebraska City, I have lately been a witness to a sight, rare and singular to me. The last day of August, near the middle of the afternoon, quite a number of grasshoppers were seen alighting, and that number rapidly increased till a little before sunset. The next morning they appeared much thicker, but were only so from having crawled more into the open air to sun themselves. About nine o'clock they began to come thicker and faster from a northerly direction, swarming in the air by myriads, and making a roar like suppressed distant thunder. By looking well up to the sun they could be seen to good advantage, and could be seen as high as the eye could discover an object so small, in appearance like a heavy snow-storm, each hopper very much like a very large flake, save that it passed by instead of falling. The number was beyond imagination—the leaves of the timber in this section of the Territory would be but little in comparison. The air was literally full of them, and continued so till along in the afternoon, when the air was free of them, countless millions having passed on, leaving other countless millions covering the earth to devour vegetation. Sunday and Monday being cloudy and damp, they contented themselves by devouring every eatable thing that came in their way, but Tuesday brought a repetition of the scene of Saturday. Since then they have not flown so much, and at this writing there are millions of them in this neighborhood, fortunately working their way a little east of south. I could not say "go, erring sisters, go," but I could heartily say, "go, you famine-creating, pestilential, devouring nuisance, and as you pass over water, forest and prairie, may the fishes of the water, beasts of the forest and fowls of the air, grow fat upon your little carcasses, till the last one of you finds your last camping ground in the power of some hungry enemy."

Their present visitation may be for some good, but I am too blind to see it. Their ravages here have drawn down many a hearty, yet uncouth, expression of disgust and hate from honest and hard-working farmers. Go into the gardens, and see them stripped of nearly every vestige of vegetation, both stock and fruit; go into the field, and see the vines of all sorts stripped of all their leaves and eaten to the ground; go and see the corn, as completely naked as if some violent storm had torn every blade from the stalks, leaving it looking like a lot of degenerate hoop-poles; go into the orchards and timber, and see many of the smaller trees especially, almost bare, the leaves having been devoured by these ravaging creatures. Many a sad sight and many a downcast countenance now fill the roll. May a new tide in the affairs of the farmers here better their footing next year.

Yours, as ever, S. C. MAXIMA.

THE HATEFUL GRASSHOPPER IN KANSAS, 1866.

From a letter from Prof. W. S. Robertson, of Kansas, dated Sept. 12, 1866, and accompanied by numerous specimens of the perfect insect:—

The Grasshoppers sent herewith are popularly known here as the "Mormon," "Western" or "Colorado" Grasshoppers. Last month they made their appearance in the frontier settlements of Kansas and Nebraska. To-day I was expecting specimens to send you, and they came—not a pill-box full, but in clouds. As high as the eye could reach, the air was filled with them; and they came down glittering in the sunlight like huge flakes of snow, and at once commenced their vocation of destroying every green thing. Indian corn, however, seems their favorite food, and they promise to be as destructive to it as their neighbors, the Spearmen, have been to the potato. On the Nemaha the late corn has been entirely destroyed by them. Even where some men hastily cut up and shocked their corn, the grasshoppers continued their depredations, until only the bare stalks remained. Wheat when sown was eaten up, if left uncovered.

In many places the ground is fairly honeycombed by their egg-cells, which are from 3-10ths to 5-10ths of an inch in depth. The common length of the egg-cells is 1 and 3-10ths of an inch; but by calling on a number of boys for a large one and a small one, I found the extremes to be 1 and 6-10ths and 9-10ths of an inch. I have observed that these grasshoppers are preyed on by certain species of *Libellula*, (Dragon-fly or Snake-feeder.)

The following is from the special correspondent of the *N. Y. Tribune*, and appears in the *Semi-weekly* of September 28, 1866:—

COUNCIL GROVE, Kansas, September 8, 1866.

Soon after noon on Saturday, Sept. 1, a tremendous shower of grasshoppers came from the South, completely filling the air as high as one could see, and looking like a driving snow-storm. In a few moments the ground, trees, bushes and everything green was completely covered. In less than two hours the leaves of trees, bushes, corn and everything green was devoured. The weather since then has been cool and wet, so that they could not leave, as they move only in hot, dry weather. The grasshoppers are now lying thick over everything, eating the ears of corn, oats, all the bark off the trees and shrubs, water-melons, cucumbers, cabbage-heads, pumpkins, &c. It will be impossible to sow Fall wheat here unless they leave soon. The wheat, oats, rye and barley crops were first-rate here this year. Corn is cut a little short by dry weather, and is cut down by grasshoppers; still there will be enough.

The following is from the *N. Y. Sem. Tribune* of October 5, 1866:—

JOHN A. NOTTENSTEIN, Humboldt, Allen County, Kansas, writes, Sept. 11:—"Yesterday the red-legged locusts made their appearance in this vicinity, and are devouring everything green. They almost darken the sun in their flight. I put in 65 acres of wheat in the last week of August, which looked fine, but it has nearly all disappeared. By to-morrow night there will not be a spear left. Early sown wheat will be totally ruined. You will probably hear that they (the locusts) are grasshoppers, but rest assured they are not." We suppose this to be the same pest which has devastated portions of Utah, Colorado. Nebraska and Minnesota.

The Lawrence (Kansas) *Journal* of September 12, 1866, speaks as follows of the grasshopper invasion:—

In Brown County they covered a track twelve miles in width, and consumed pretty much everything green. Trees were stripped of their leaves, grass eaten up, and corn-fields literally stripped to the stalk. It is fortunate they have come so late in the season as they have, after the crops have been principally gathered. They will, however, probably do great damage to wheat fields, and if the fall should remain dry and warm, they will deposit their eggs, and, we fear, give trouble next year. A severe frost, followed by cold weather, would probably destroy these insects. They are now coming in this direction in swarms, and will doubtless be here in a few days. In North-western Kansas they fill the air so as to obscure the sun. They have been traced for a distance of two hundred miles above Fort Kearney. The Marysville *Enterprise* says of the grasshoppers in that section: "They alighted upon fields, gardens, fruit-trees, and everything green or eatable, and like a march of two hundred and fifty army-corps, devoured everything they touched. This whole country has been taken by them, and the rear-guard is still with us, guarding what vegetables and green leaves the army has left. Farmers are seriously alarmed lest the corn should be totally devoured. They seem to be passing in a south-west direction."

The following is from the *N. Y. Sem. Tribune* of September 25, 1866:—

GRASSHOPPERS IN KANSAS.—The Leavenworth papers report, that a vast army of grasshoppers have reached Lawrence from the West. They had cleaned out Topeka, the Capitol, of garden vegetables, grass and clover, and left the ground as if burned with fire. Corn is eaten to the roots. How widely they extend is not stated. They travel four or five miles a day.

Mr. Wm. H. Lykins of Lawrence, Kansas, writes to me as follows, under date of Sept. 27, 1866:—

With this I send you a few specimens of the Grasshoppers or "Locusts" of the ancients, which are now covering the land. [These have failed to arrive. B. D. W.] All that you have ever heard or read of their vast numbers can now be seen in Kansas. Coming so late in the season, they have not done much damage, except in a few cases where they have attacked fall wheat, corn-blades and tobacco. One gentleman informed me, that they arrived on his farm about daylight, and before breakfast had completely eaten up a patch of tobacco of about five acres, and then sat on the fence and begged for a "chaw" from every one that passed. The latter part of the story is rather doubtful. They first made their appearance about Salina, high up on the Smoky Hill fork of the Kansas River, and from thence have spread over Eastern Kansas. There is something weird and unearthly in their appearance, as in vast hosts they scale walls, housetops and fences, clambering over each other with a creaking, clashing noise. Sometimes they march in even regular lines, like hosts of pigmy cavalry, but generally rush over the ground in confused swarms. At times they rise high in the air, and circle round like gnats in the sunshine. At such times I think they are caught by currents of our prevailing westerly winds, and are thus distributed over vast tracts of country. They are now depositing their eggs, and we shall probably have a second edition of them next spring. One farmer informed me, that on his place there were about four holes to every square inch; and in some places I have seen their nests even thicker than this. At what time do the eggs hatch out?

The following letter is from M. M. R., of Douglass County, Kansas, and bears date October 1, 1866:—

The grasshoppers have made their appearance in this part of Kansas by the billion. They are now depositing their eggs in the ground, and almost every person is wondering if they will make their appearance next summer. We apply to you for information. Will their eggs hatch out next spring, and can they survive the winter without being destroyed?. Farmers are predicting, that we shall not be able to grow anything next summer on account of the grasshoppers.

How remarkably do the above graphic descriptions agree with that given by the prophet Joel of the locusts of Scripture! "A day of darkness and of gloominess, a day of clouds and of thick darkness. * * The land is as the garden of Eden before them, and behind them a desolate wilderness; yea, and nothing shall escape them! * * Like the noise of chariots on the tops of mountains shall they leap, like the noise of a flame of fire that devoureth the stubble, as a strong people set in battle array. * * Before their face the people shall be much pained: all faces shall gather blackness. They shall run like mighty men; they shall climb the wall like men of war; and they shall march every one on his way, and they shall not break their ranks. * * They shall run to and fro in the city; they shall run upon the wall; they shall climb up upon the houses; they shall enter in at the windows like a thief." (*Joel*, Chapt. II, 2—9.)

The facts referred to above, coupled with the circumstance that Dr. Velie found this same insect very abundant in 1864 in Colorado, and heard that it was by far the most troublesome and prevalent grasshopper there, indicates that it must have travelled from Colorado to Kansas and Nebraska in 1866, being probably assisted in passing the intervening barren plains by westerly winds.

There can be little doubt, I think, that wherever the insect has laid eggs this autumn, there the great bulk of the eggs, unless previously destroyed, will hatch out next spring. In this event, the mischief will be a hundred-fold as great as any inflicted in 1866. For then the country will have to subsist them, not only for a few weeks in the perfect or winged state, but for several months, while they are slowly and gradually attaining maturity. In confirmation of this theory, it may be observed, that in the case quoted above of their infesting Minnesota, they occurred in two successive years. It is possible, indeed, that some very peculiar weather, for instance very heavy rains, followed immediately by very heavy frosts, might destroy their eggs; but I would give but very little for such a chance. As to their natural enemies—skunks, shrew-mice, moles, birds, toads, spiders, cannibal and parasitic insects, &c., &c.—it is out of the question that they can exist on the spot in sufficient numbers, to make any impression upon such hosts of egg-cells as are stated to be already constructed. In a year or two's time such enemies might multiply, so as to form an efficient check to the future multiplication of this grasshopper. But, in their present numbers, which are of course proportioned to the numbers of the various species of insects, &c., usually found in Kansas and Nebraska, it is impossible that they can exert any influence upon so multitudinous a foe.

It might be supposed at first sight, if the Hateful Grasshopper can hatch out in Kansas and Nebraska in the spring of 1867, from eggs laid in the autumn of 1866, by females which had travelled thither from Colorado, and if, as I have stated to be likely, they can arrive at maturity during the summer of 1867 in Kansas and Nebraska, that in the autumn of 1867 they will lay a fresh stock of eggs there and propagate thus indefinitely from year to year. But there are scientific considerations which make such a contingency highly improbable. Dr. Velie, the Illinois Ornithologist, and Dr. Parry, the Iowa Botanist, both of whom were personally witnesses of the operations of this insect in Colorado in 1864, assure me that it breeds there in the mountains and comes down into the settlements in vast swarms through the canons (kanyons) or deep perpendicular cuts, leading from the mountains to the more level country. Hence, it is evidently a strictly alpine insect; and when it arrives in Kansas and Nebraska it arrives at a point many thousand feet nearer the level of the sea than its native home, and where consequently the "conditions of life," as they are called by naturalists, i. e. food-plants, climate, density of the air, temperature, moisture, &c., &c., are very different from those of its native home. Now, it is a general law in Organized Nature, as has been clearly expounded by Darwin, (*Origin of Species*, chapter I,) that changes in the "conditions of life" often operate peculiarly and exclusively upon the generative system, so that an animal or a plant, otherwise apparently healthy, becomes unable to reproduce its species. For example, various kinds of Hawks and Falcons have been tamed in very large numbers for the last thousand years for the sport of hawking. Their general health does not appear to suffer at all in confinement. Yet, from the changed "conditions of life" to which they are thereby subjected, they almost invariably become barren; and there is scarcely an instance on record, of any Eagle, Falcon, Kite, Buzzard or Hawk having ever bred in a state of domestication, though from the very great price formerly given for the rarer and more highly esteemed species, it must of course have been a pecuniary object to induce them to do so. Experiments in different Zoological Gardens have led to the same result. Applying these general principles to the case of the Hateful Grasshopper, we may reasonably expect that the constitution of the insect will be so affected by the great change of climate, air, &c., which it experiences in Kansas and Nebraska, that it will become barren in the autumn of 1867, and consequently that the race will then and there die out. And this theory is confirmed by the fact, that although the people of Minnesota were afflicted by what was probably this same insect in 1856 and 1857, so that "many resolved then to keep two years' supply of produce on hand afterwards," yet that after 1857 it totally disappeared there. Indeed, since in the course of the last century or two, many swarms of this insect have probably descended into Kansas and Nebraska from Colorado in different years, if it was physically capable of propagating for an indefinite number of years in those countries, we should in that case have found it there long ago. But this does not appear to have been the case.

For these reasons I do not consider that the Hateful Grasshopper is at all likely to infest Kansas and Nebraska after the season of 1867, unless fresh swarms should descend upon those countries from Colorado; but that it will, if not artificially checked, terribly infest those countries in the summer of 1867, I have but little doubt. In the words of the prophet, as already quoted—"The land will be as the Garden of Eden before them, and behind them a desolate wilderness."

Under these circumstances, and as no plan for destroying the eggs can be effectual, unless it is generally adopted, I should strongly recommend the authorities, in Kansas and Nebraska, to offer a bounty of so much a bushel for grasshopper eggs, on the same principle that bounties are offered in most new States for wolf scalps. This plan has been often tried in European countries, and found to work well. Women and children, who would otherwise be earning nothing, engage in the work; and after all, though it might perhaps cost the State a few hundred thousand dollars, yet the money does not go out of the State, and the crops of next year will be saved. It is better to feed poor people than to feed grasshoppers, and according to the homely old adage "a stitch in time saves nine." Without waiting for the Legislature to take action, let the County Court of each infested County at once offer a suitable bounty, and appoint men at suitable points to receive and measure the eggs and pay for them in County Orders. The eggs could probably be utilized by feeding them out to hogs; but this could be easily ascertained by a few experiments. If something of this kind is not done, folks in Kansas and Nebraska had better lay in supplies of provision for two years ahead, wherever the grasshoppers have swarmed this autumn; for in all probability there will be a partial famine in that country in 1867.

I do not think that it is at all probable, that these Colorado grasshoppers will ever cross the Mississippi, as the Colorado Potato Bug has done, and pass onward to the Eastern States. In the latter case there were physical obstacles to the eastward spread of the insect, previously to the settlement of the Rocky Mountain Region. But, in the case of the Colorado grasshoppers, there was no such obstacle; and as they not hitherto spread eastward, there is no reason to believe that they will do so hereafter.

B. D. W.

The Striped Cucumber-bug.

On p. 110 of Vol. I, of the PRACTICAL ENTOMOLOGIST, I stated that the Editor of the *Western Rural* had "apparently" confounded the "12-spotted Flower Beetle" with the true "Striped Cucumber-bug." In his issue of Sept. 12, 1866 he shows that he has not, and I have no doubt that he is right. Hence it results that the Striped Bug does really infest German Asters, which I was not previously aware of. As to Dahlias, it is not stated to attack them; and it was to Dahlias that my observations more particularly applied. B. D. W.

☞The sign (♂) is used in Natural History as an abbreviation for the word "male:" the sign (♀) for "female." In Astronomy the former sign denotes the Planet Mars,and the latter the Planet Venus. The sign (♀) occurs profusely in old Egyptian monuments in company with other "hieroglyphics," as they are called, or the sacred language of the ancient Egyptians, and has been known for centuries by the name of "crux ansata," or "the cross with a handle to it."

[From the Western Rural, June 23, 1866.]

The Canker Worm.

Office of State Board of Agriculture,
Lansing, Mich., June 11, 1866.

I visited Calhoun county last week, chiefly for the purpose of ascertaining the condition of the canker-worm colony, near Marshall, about which I wrote you a year ago.

The orchards where I saw the worms last year are still infested, and they have also appeared this year on several orchards where they had not been seen before; but where they prevailed in the greatest numbers in 1864 and 1865, they are less numerous this year. The cause of their diminution in their old haunts, is obscure. It is possible that in some instances the ground was over-stocked last year—that is, the foliage was not sufficient to carry to maturity all the worms that fed upon the trees—and that many of the starved larvæ died before they reached the perfect state. It may be that the frosts and unusually cold weather which occurred last Spring, soon after the insects hatched, destroyed many of them.

I could not learn that means either of destruction or prevention had been much used. Edwin Wilson, of Marengo, whose orchard has suffered most, dug the earth away from the trees last Fall, after the ground had been somewhat frozen, and put round each tree about a peck of strong wood ashes, which lay there till the trees leaved out, last Spring, when they were spread about. It was supposed that the ashes had killed the insect in the pupa state, to some extent; but it does not appear that the decrease in the number of worms this year, as compared with the last, is any greater in this orchard than in others where no ashes, or anything else, were applied.

Gideon Townsend, of Marshall, whose fine orchard was completely defoliated last year, put round his trees in the Spring of 1865, a good mulch of straw as a manure for the trees. He allowed swine to run in the orchard in the Fall, and they rooted in the straw almost constantly. His poultry, too,—barn-yard fowls and turkeys,—were busy day after day, scratching in the straw and earth about the trees, from which they appeared to obtain food which they liked much. It is probable that the pigs and poultry devoured many canker-worms in the pupa state. The worm, as it drops from the branches to secure for itself a lodgement in the ground, where it may undergo its transformation, generally moves towards the tree, so that the chrysalides are chiefly formed within a comparatively small distance from the trunk.

Effect of the Worm on the Tree.—It is plain that the fate of trees whose foliage is year after year destroyed by this insect, is to be the same here that it has been elsewhere—it is *death*. People seem to have been slow to believe this. They saw their trees, whose leaves had all been eaten by the canker-worm, put forth a new set; sometimes they had a few unseasonable blossoms which were followed by worthless fruit, and from this show of life and vigor, it was inferred that the trees were not much injured. But experience dissipates this hope, and proves that the apple tree furnishes no exception to the rule, that plants long deprived of their leaves must die.

Two or three trees in Mr. Wilson's orchard, on which the canker-worm first appeared, are totally dead—the bark cleaving from them in strips. These were first attacked in 1862. I was informed last year that it was in 1863, but this was a mistake. Several other trees, some of the largest and best in the orchard, are nearly dead—will inevitably die this season. In fact, the vitality of all the trees is so weakened, that though on many of them there are not worms enough this year to do much injury to the foliage, they will bear no fruit. Many of the best trees in Mr. Townsend's orchard show that they are fatally injured, and this will soon be the result wherever the insect has established itself, unless preventive measures against its attacks are used, or some unusual causes should greatly diminish its numbers. Its ravages are now obvious in at least six different orchards, and it is spreading year by year. It should not be overlooked, that according to information published by Mr. Lyon, of Plymouth, through your columns, the insect has appeared in other localities in the State.

What should be done?—This important question may be answered by saying:—Adopt the best means of preventing the female insect from ascending the tree. Various contrivances have been invented for this. In my Report for 1865, as Secretary of the Michigan State Board of Agriculture, I have given an article on this insect, with figures of it in various stages, together with descriptions of apparatus for protecting trees. A cut is given (at page 27) of "Merritt's Patent Tree-Protector," made and sold by the American Tree Protector Company, No. 19 Phœnix Buildings, Boston Mass., from whom a pamphlet may be obtained gratis, on application, giving a particular description of the apparatus, and directions for applying it.

I have not yet learned the full results of last year's experience at the East with the different "Protectors," but I intend to obtain as correct information as practicable on this subject, and when it is obtained, I will lay it before your readers.

Next Fall and the early part of Winter, if mild weather should occur after the ground has been frozen, will be the time when the trees should be protected against the female canker-worm in its perfect state. It may be that, as last year, the insect may not be matured at the time mentioned; but the trees should be protected as a safe-guard; and the protection should be continued until the *running season* of the insect in Spring is over. It should, therefore, be kept constantly in mind that the coming fall is the time to begin the defence against this dangerous enemy.

And here it may not be inappropriate, to use a word of caution against the use of alleged remedies, which either do no good, or are worse than useless. Of this character is the putting of sulphur into the trunk of the tree, to *poison* the canker-worm and other insects. A prescription of this kind goes the rounds about as often as it is supposed a new set of readers have grown up, who never heard of it. At every period of its appearance it has been followed by proof that it was good for nothing, but it will come round again. It was last started by a correspondent of the *Prairie Farmer*, and was extensively copied.

To know that such things not only do no good, but do positive harm, I would merely refer to the issue of the paper above mentioned of the 9th inst., in which a correspondent states, that when he saw the story of destroying canker-worms with sulphur, he thought it was so plausible that he determined to try it, and accordingly "put twenty-seven pounds of flowered sulphur in and on about one hundred and twenty trees; and the result is, that the foliage of the trees is nearly all eaten up and the fruit nearly all destroyed." Just as might have been expected.

Permit me, in conclusion, to acknowledge the obligations I am under to Allen T. Lacy, Esquire, of Marengo, and Hon. S. S. Lacy, of Marshall, for valuable information and assistancer endered me, in the prosecution of my inquiries respecting the appearance of the canker-worm in the locality above mentioned. SANFORD HOWARD.

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Fire-blight.

Recently we have had accounts from Northern Ohio and other sections, speaking of a blight affecting the ends of all young twigs in pear, apple and quince trees. In some cases not only is this year's growth affected, but more or less of the last year's growth, until the trees look as if a big fire had been made near and scorched them. Can our entomologists tell us if this be not (as we suspect) the attack of the *Scolytus pyri*, and is it not because of the crude sappy condition of the tree?—*Horticulturist*, August, 1866.

REMARKS BY B. D. W.—Unless the writer refers to the curling up of the leaves by the common *Aphis* or Plant-louse, this must be the notorious Fire-blight, which has for years been the scourge of Pear-growers, and in a far less degree of Apple-growers. Whatever be the cause of this Blight, it is most certainly not produced, as Harris and Fitch supposed, by the minute Boring-beetle known as *Scolytus pyri*. For I have searched whole orchards perishing by the Blight in Illinois, and failed to find this insect or the slightest indications of its work. As to Mr. Downing's theory that it is sometimes caused by "Frozen sap," it is pure unmixed hypothesis unsupported by a single fact. Indeed both facts and common sense are opposed to it. In a pear-orchard of fifty trees, five or six trees perhaps are blighted every year, not in any particular corner, but promiscuously. Why should Jack Frost select these particular trees to freeze their sap and let the others alone? Besides, if frost caused Blight, we should have Blight most prevalent in the summer following a severe winter; which is not found to be the case. "What then," it will be asked, "is the cause of Fire-blight?" I can only answer that I do not know. I have, indeed, an opinion on the subject; but believing is not knowing, and faith is not science.

The Hessian Fly.

Wheat growers suffer greatly by the ravages of this insect. It can be easily destroyed in the following manner:—About the middle of August sow a strip of wheat adjoining where you intend to put your crop—say one or two acres. About the middle of September sow your field. When that has come up and shows cleverly, plow under deeply the first sown. The fly is headed, and your crop is safe.—*Colman's Rural World.*

REMARKS BY B. D. W.—I suspect that the whole virtue of the above prescription lies in sowing the crop in the middle of September, and that the strip sown in the middle of August does little or no good, except by preventing a man's home-grown Hessian Flies from straying away to trouble his neighbors. It has long been known that wheat, that does not appear above ground till after the Hessian Fly has disappeared, escapes the ravages of that insect. Five years ago I found that the farmers in Southern Illinois were fully aware of this fact, and governed their time for sowing accordingly. Usually the Fly comes out about the first few weeks in September and disappears in a week or so, the time varying a little according to the latitude. But the safest rule is to notice in each neighborhood, at what date the latest sown wheat that is taken by the Fly was sown, and to sow for the future a little later than that particular date.

ANSWERS TO CORRESPONDENTS.

☞ TO MICHIGAN CORRESPONDENTS.—A Michigan firm, doing business in the nursery line, sent me their subscription for six copies of Vol. II, of the PRACTICAL ENTOMOLOGIST. This I duly forwarded to Philadelphia, along with other matter, but it failed to reach head-quarters, through the fault of the Post-office. Will the firm please repeat their subscription, as I carelessly omitted to take a note of their names? B. D. W.

T. M'Graw, Wisc.—The black worms, striped lengthways with many narrow yellowish lines, *with two long black horns on their necks*, and about an inch long, are the larvæ of a large reddish-brown Moth, *Dryocampa senatoria*, and they feed exclusively on the Oak. You say yourself that you took the specimens sent, off an Oak. There is a very similar worm, as to its black color and yellowish lines, but differing in having *no black horns on its neck* and in the neck itself being usually bright yellow, whence it has been called in English "the yellow-necked worm" by Dr. Fitch. It has the singular habit of generally sitting when at rest with its head and tail each cocked up in the air, *which the other one never does.* This "yellow-necked worm" feeds indiscriminately either on the Apple-tree or on the Oak, as I have recently proved by shifting a large brood of them, taken off the Oak, on to a diet of apple-leaves, upon which they thrive most admirably. It is also found on several other trees, Thorn, &c., and Dr. Warder says that he found it to infest the Peach. It produces an entirely different moth from that produced by the first worm, and its scientific name is *Datana ministra.* As you may see from the back numbers of the PRACTICAL ENTOMOLOGIST, Dr. Warder of Ohio finds this insect a terrible pest in his orchards; and no doubt it was this species, and not the one which you sent me, which, as you say, "stripped all the leaves off your apple-trees and is now feeding on Burr Oak." Mind now, I do not at all dispute the fact, that "yellow-necked worms" migrated from your Apple-trees on to your Oaks—for I know they can do this by actual experiment. All I say is, that you sent me by mistake specimens which are entirely different from those that really stripped your apple-trees, aud which never will and never can feed upon apple-tree leaves. If you doubt this, try the experiment yourself, and you will soon see that the worms *with two long black horns on their necks* will die before they will eat apple-leaves.

There is a worm very similar to the "yellow-necked worm," which feeds exclusively upon Hickory and Walnut, and differs chiefly in having no yellow neck and in often wanting the yellowish stripes. Respecting this last see the answer to Samuel S. Lacy, Michigan, in No. 11 of the Practical Entomologist. Unlike the "yellow-necked worm," it cannot feed upon anything but Hickory and Walnut; and if you have Hickories full of them close to your Orchard, you need not be at all afraid that they will attack your Apple-trees. Whereas if you have Oak-bushes full of the "yellow-necked worm" close to your Orchard, and if, as I have often seen them do, they should strip the Oak-bushes clean, they will be just as likely as not to invade your apple-trees in the course of their travels in search of food. "A word to the wise is sufficient." Kill the "yellow-necked worms" wherever you find them, without mercy; but unless you are anxious about your Hickories and Walnuts, you may safely leave the black worms without any yellow necks severely alone.

You send me also some large red Plant-lice which are infesting your Cranberries, and along with them a small oval larva over ⅛ inch long and with his back covered, as you say, "with a white fuzz," which fuzz, if closely examined, looks like short pieces of cotton thread growing out of his back in regular rows and shorn off evenly like the hairs of a cloth's brush. This larva you suppose to be also doing great damage to your cranberries. You never made a greater mistake in your life. He is your friend, instead of your enemy; for he feeds exclusively on the plant-lice that do the real mischief in your cranberry-patch. To make quite certain of this I put the specimen, along with seven or eight of the Plant-lice, into a vial last night, and by six o'clock this morning he had killed and eaten them every one, leaving nothing but their empty skins. Yet last night when I received them from you—thanks to your care in packing them all in a tight little tin box—they were all alive and kicking and in vigorous health. Hence you must see, that, instead of killing off these "fuzzy white worms," you should cherish them as the very apple of your eye. There are a great many different species of them, varying in the fashion of their "fuzz," but they all belong to the genus *Scymnus* of the great Family of Ladybirds (*Coccinella*) and the Order of Beetles (*Coleoptera*). The perfect beetles, produced from these different "fuzzy" larvæ, are all of them small, obscure-looking, round, brownish insects, many species with a reddish tail; and are quite unlike those gaily-dressed gentlemen, the true Ladybirds. I have bred a species closely allied to the *Scymnus hemorrhous* of LeConte, in prodigious numbers, from a Cock's-comb-like gall on the leaf of a species of Elm made by a Plant-louse, (*Thelaxes ulmicola* Walsh). The larva of this last lives inside the gall, feeding on the bodies of the poor Plant-lice at his leisure; but I know several other species that live at large on the surface of oak-leaves, feeding no doubt on the various plant-lice that afflict that tree. I cannot tell, without rearing the perfect beetle, to what species your larva belongs, as I never saw one exactly like it before. I notice that you say that you put *two* of the "fuzzy" larvæ in the box. There was but *one* in the box when I opened it. Hence I infer that one of the two ate up his brother on the road. This is an unamiable propensity to which a great many of these Cannibal insects are addicted. But we must bear with their little failings in this respect, in consideration of the great good that they do us by making war on the Plant-lice.

A. A. Jackson, Wisc.—The green worm as big as a boy's finger and with a horn growing on its tail, that you find on the Tomato vine, is the common "Potato worm," which would be more correctly called "Tomato worm," because for one found on Potato vines there are a hundred found on Tomato vines. It is occasionally found on Tobacco plants also. About this time of the year it goes underground, and changes into a mahogany-brown pupa with an appendage like the handle of a jug growing out of its head, and containing the long proboscis of the future moth, which will appear near summer. (See the Answer to F. W. Noble, Missouri, in No. 11 of the Practical Entomologist.) The worm is not in the least poisonous, neither is the horn on its tail a sting, as many suppose. I have handled hundreds with my naked hands without their ever attempting to bite, much less sting. You may see from an Article in No. 1 of the Practical Entomologist (p. 5), that folks in the East are no wiser than folks in the West about this stinging humbug. There are no insects common with you that you need be afraid to handle, except the different kinds of wasps and bees; and even with these it is only the females that sting, the males having no stings at all, like the drones or males of the Honey-bee.

Rev. Jas. B. Fisher, N. Y.—I sent some of the large larvæ, that you found adhering to the head and body of a young swallow, to Baron Osten Sacken, who is the great authority on the Order Diptera in North America, and he has obligingly replied as follows:—"The larvæ found on the head of the Swallow probably belong to one of the genera of the great *Musca* family in the vicinity of *Musca* or *Sarcophaga*, and certainly do not belong to the *Œstrus* family. Larvæ of the *Musca* family looking like those of the *Œstrus* family, are very common. Brauer, who published a Monograph of the *Œstrus* family in 1863, acknowledges this resemblance of the two classes of larvæ, and adds that no thorough distinctive character can be established at present. As to the occurrence of larvæ of the *Musca* family on Swallows, Dufour found larvæ of *Lucilia dispar* in the nests of that bird. (*Ann. Soc. Entom. France*, 1845, p. 205.) Another instance of these larvæ killing birds in nests is to be found in Rossi (*Dipt. Austriaca*, p. 59.) He says that Mr. Scheffer found larvæ of *Musca erythrocephala* and *M. azurea* in birds' nests. Young birds, apparently thriving at first, suddenly succumbed to them." In neither of these instances, however, as you will observe, were the larvæ found actually adhering to the body of the young bird, as in the case which you have been the means of recording. Hence your observations are especially valuable. It cannot be impressed too strongly upon the minds of those who are not professed entomologists, that by carefully observing and stating facts, and forwarding specimens along with those statements to reliable Entomologists, they advance the interests of Science fully as much, as if they were themselves as well-read in Coleoptera as Dr. LeConte, or as learned in Diptera as Baron Osten Sacken.

E. Daggy, Ill.—I forwarded a specimen of the minute two-winged fly, bred from the larva, that attacks so ferociously the bark-lice inhabiting the leaf-galls on the Clinton grape-vine, to Baron Osten Sacken. He has been kind enough to inform me, that "it belongs apparently to the genus *Leucopis* of Meigen, which is known to live on *Coccus* and also on the genera *Aphis* and *Chermes*," which last also appertains to the *Aphis* family, though it has some strong relations with *Coccus*. "To what family," he adds, "Loew would refer this genus *Leucopis*, I do not know; but it is to be placed somewhere in the vicinity of *Chlorops*, *Agromyza*, &c." Loew has split up the great *Musca* family into a large number of smaller families; and *Chlorops* belongs to his *Oscinis* family, which is immediately followed by the *Agromyza* family.

Thos. C. Wright, Ohio.—The "green worm resembling a Tobacco worm" found on Tomato vines is the common "Potato-worm," respecting which see Practical Entomologist, No. 1, p. 5, and answer to F. W. Noble, Mo., in No. 11, p. 115, and to A. A. Jackson, Wisc., in this present number. Respecting "the white cocoons or eggs" which you found attached in great numbers to it, see answer to M. S. Hill, Ohio, in No. 6 of the Practical Entomologist, p. 46. The specimens sent me by Mr. Hill were precisely similar to those which you send. If you had closely examined the worm, you would have noticed a little black speck at each spot where a cocoon was attached, which represents the hole through which each *Microgaster* larva emerged from the body of the worm to spin its white silken cocoon. The reason why, after the cocoons were detached from the worm Oct. 3, you found on Oct. 4 a fresh lot adhering to it, is that all the parasitic larvæ did not emerge on the same day. The clinging of the worm with such tenacity to the vine, just before its death on Oct. 9, is the rule with ichneumonized larvæ, as I long ago observed in a Paper of mine, on the Army-worm and its parasites, published in the *Transactions of the Illinois State Agricultural Society*, Vol. IV, p. 363. You will find a case of the same kind explained in the last paragraph but one of the answer to W. H. S., Ill. in No 11 of the Practical Entomologist, p. 112. I do not at all wonder at your being greatly puzzled by such phenomena as these, though to me they are of such daily occurrence, that I have almost ceased to be astonished by them. It is only within the last 100 years that the thing has been satisfactorily explained. The naturalist Swammerdam, for instance, bred in the last century 545 small ichneumon-flies from chrysalises, which in the ordinary course of nature would have changed to butterflies, and records it as a "thing very wonderful" that "the life and motion of the four butterflies seems to have *transmigrated* into those of the 545 others." Perhaps the puzzle was greater to him, because, on his supposition, one life must apparently have "transmigrated" into 136¼ lives—thus showing life to be sometimes a fractional quantity.

Chas. H. Peck, N. Y.—The caterpillars sent are the larvæ of *Dryocampa senatoria*, respecting which see Answer to Thos. McGraw, Wisc., in this No. of the Practical Entomologist. The dull brick-red beetle about 1-5 inch long, found in June on buttercups (*Ranunculus acris*) is *Galeruca rufosanguinea* (Say). The rather elongate black beetle about 1-10th inch long, with the sides of the thorax and four stripes on the wing-cases yellow, which you find in July and August on Azalea nudiflora and other plants growing in marshes, is commonly considered to be *Chrysomela trivittata* Say, but I believe it to be an undescribed species. I have a specimen in my Cabinet taken near Chicago. Both these insects belong to the great *Chrysomela* family, which are all leaf-eaters, and many of them injurious to cultivated plants.

Since the above was in type, I have been favored by Dr. LeConte, to whom I forwarded a specimen of your *Chrysomela*, with the following clear, brief, and very valuable synopsis of the group to which it belongs. As I supposed, your species is determined to be undescribed, and must now be known as *P. varipes* LeConte:—

"A. Elytral vitta united with the yellow margin both at base and tip, crossing obliquely from the humerus to the space between the 2nd and 3rd striæ.

1. Body robust, blue-black and yellow above, black beneath. Thorax nearly twice as wide as long. Length .18—.22 inch............*Prasocuris obliquata* n. sp., LeConte.

2. Body more elongate, greenish-black and yellow above, beneath black. Thorax a little wider than long. Length .14—.18 inch....*Prasocuris varipes* n. sp., LeConte.

Var. *α*. Tibiæ pale, tarsi ferruginous, femora black.
Var. *β*. Tibiæ, tarsi and femora black.

B. Elytral vittæ not united at the base with the margin, straight and parallel, occupying the space between the 2nd and 4th striæ.

3. Body very elongate, thorax not wider than its length. Length .20—.24 inch...*Prasocuris phellandrii* Eur. & N. A.

Var. *α*. Feet varied with testaceous.
Var. *β*. Feet black. *Helodes vittata* Oliv. *Helodes trivittata?* Say."

E. E. Sheldon, Mich.—The "flying-bug" about ⅛ inch long, that you send, and that you suppose may possibly be the Hessian Fly, is a harmless dung-feeding beetle belonging to the genus *Aphodius*, which includes a very large number of species, some of them very closely allied to each other. I cannot determine the species with certainty, as your specimens reached me all broken to pieces, and pressed as flat as a pancake; but I believe it is *Aphodius serval* (Say.) You should have enclosed them either in a quill or in some small paste-board box with cotton-wool or some such matter. The Hessian Fly is as unlike this "flying-bug" as it is possible to conceive, being shaped almost like a common Musketo, only much smaller.

Henry B. Howarth, Wisc.—What you take for the eggs of some insect, found on the ground and also on unbound oats, are not eggs, but the white silken cocoons of a small *Ichneumon* fly, probably belonging to the genus *Microgaster*, though the genus *Pezomachus*, a kind of *Ichneumon* fly that has no wings at all, nor even any rudiments of wings, also makes just such cocoons. All the *Ichneumon* flies are parasitic insects, chiefly preying upon different kinds of caterpillars, and should be carefully encouraged in their good work. See the answer to M. S. Hill, in the Practical Entomologist, Vol. I, No. 6, p. 46.

Thos. Meehan, Penna.—The bark-louse (*coccus*) found on red oak reached me in very bad order, owing to bad packing. I am acquainted with a very similar species, found on white oak. On the general history of Bark-lice see the answer to L. E. Harmon, in No. 10 of the Practical Entomologist, p. 100. The brown specimen over ½ inch long, is the pupa-shell of some two-winged fly belonging to the *Syrphus* family. I have bred a species of *Xylota* from somewhat similar pupæ found under loose bark, and have often noticed specimens like yours attached to the twigs of different trees, especially birches.

W. H. S., Bloomington, Ill.—In the second batch of the tendril galls which you send, there are plenty of the larvæ of the *Leucopis* fly; so that there is now no doubt that they attack the louse of this gall as well as that of the *vitifoliæ* gall. I have since discovered tendril-galls precisely similar to yours on a Clinton vine badly infested by the *vitifoliæ* gall; so that I begin to doubt now whether both galls may not be produced by the same insect. To determine the point with certainty, it would be necessary to breed the winged insect from each.

I find these same *vitifoliæ* galls pretty abundant on a large fruit-bearing Delaware grape-vine in the garden of Geo. Mixter, Esq., of Rock Island, Illinois—which vine, by the way, is not shaded by anything. It is not to be found, after a careful examination, on any of the cultivated varieties of the wild Northern Fox-grape (*Vitis labrusca*), such as Isabella, Catawba, Concord, &c., even when they grow interwining among Clintons infested by this gall. Once or twice, indeed, where Clinton and Catawba vines grew promiscuously intermixed, and the Clinton was swarming with these galls, I have found a few imperfectly developed galls on Catawba leaves, but they were of very small size and widely open above, and seemed to be mere abortive attempts of the insect to establish a gall there. Hence, as the fully developed gall seems to occur solely on the wild Frost-grape (*Vitis cordifolia*), and on the tame Clinton and Delaware grapes, and as the Clinton is known to be a cultivated variety of the Frost Grape, I should infer that the Delaware is so likewise. At present, all that is known about this last is, that it originated in New Jersey, whence it was removed to Delaware, Ohio, and finally disseminated over the whole Union. The Germans, however, claim that the Delaware is identical with an exotic grape—known as "Traminer" in Germany. But it is a very general, though not a universal rule, that each species of gall-making insect is confined to one particular species of the genus of plants inhabited by the genus of insects to which it belongs, including, of course, all the varieties, whether cultivated or otherwise, of that particular species; and I do not know of a single instance where an exotic species of plant has been attacked by a Native American gall-maker. For example, there are twenty-five or thirty different kinds of American galls growing on different American Willows: yet I cannot find any galls at all on the exotic White Willow, even where it grows side by side with gall-bearing American Willows. You remark that you know of "two acres of Clinton grapes, near Bloomington, planted 6 by 4 feet apart, that are about ruined by this *vitifoliæ* gall." Perhaps, therefore, as the Clinton is otherwise very objectionable on account of its ripening so unevenly, it would be best to give up growing it.

Thos. M. Harvey, Penna.—The robust grass-green worms about ¾ inch long, with prickly horns before and behind, and a round brown mark on the middle of their backs, are the larvæ of *Empretia stimulea* (Clemens), commonly known as the "saddle-back" from the mark on their backs. They feed not only on grape-vine, where you found them, but on different fruit-trees, the rose, Indian corn, and a variety of other plants. The prickles on the horns operate like a nettle on any part of the body where the skin is not thickened. They belong to a very remarkable family of moths, the larvæ of which have no legs, and glide along with a snail-like motion. I have never met with the insect out West and was glad to get your specimens, several of which spun up on the road. It is the same insect referred to in the answer to S. M. P. of New York, in Vol. I of the Practical Entomologist, p. 34.

J. B. Ellis, N. J.—Six years ago there was a larva answering tolerably well to the description of yours, that almost entirely ruined the corn-crop in Kansas by burrowing into the ears. You will find a wood-cut of it and of the moth produced from it, in the *Prairie Farmer* of Jan. 31, 1861. It was popularly known as the "corn-worm." We have another worm in Illinois which has the same habits, but has never hitherto appeared in such numbers as to attract much attention. It is, however, altogether distinct from the Kansas "corn-worm." and likely enough there are several species that attack corn in this manner. Please send me a dozen or two of specimens, that I may examine into its Natural History. If possible, pack them in a little tin box, along with some of their natural food. You need not leave any air-holes.

Willie C. Fish, Mass.—Your figure No. 1 is a geometer moth, but I cannot name it. No. 2 appears to be *Datana ministra*, but it is difficult to name insects with certainty even from the very best colored figures. No. 3 is undoubtedly *Limacodes scapha*, the larva of which was first described by Harris and the perfect insect by myself. The "bunches" upon oak-twigs are a species of *Lecanium* (bark-louse) apparently undescribed. In the fore part of the autumn you will find underneath the dry body of the female, great numbers of minute eggs. The moth you bred from one of these bunches was undoubtedly, as you infer, an intruder. The tree-hoppers taken on potato-vines, Sept. 10, are the *Entilia sinuata* of Fabricius, rather a rare insect, though the allied *Entilia concava* of Say is very common. The former is readily distinguished by having the ridge on its back scooped out deeply in a complete semicircle, instead of being only slightly scooped out. The small blood-red beetle with four steel-blue spots upon the wing-cases, is *Collops 4-maculatus* (Fabr.) The lady-bird is *Hippodamia glacialis* (Fabr.) The two-winged horse-fly is *Chrysops vittatus* (Weidem.); it is often called the "ear-fly" in the West, from its habit of attacking the ears and head of horses. The small brown beetle taken under pine-bark is the *Hylastes pinifex* of Fitch, as kindly determined for me by Dr. LeConte.

J. H. Garman, Ohio.—The yellow worms over half an inch long with a row of velvety black dots placed crossways on each joint of their bodies, are the larvæ of *Procris americana*—an old and well-known enemy of the grape-vine. You say that you "found them August 29 on the leaves of the Isabella grape-vine, which they had almost eaten up, on the underside of the leaf, their heads to the edge, where they continue to eat and back out till the leaf is consumed. They are often side by side and a dozen to the square inch." This agrees exactly with the account given of their habits by Harris. In July I received from Mr. Borden, of Pennsylvania, the larva of another but smaller species of *Procris*, which infested his grape-vines, and in the Answer to that gentleman (Practical Entomologist No. 11, p. 111), you will find an account of the moths produced from the different larvæ of the genus *Procris*.

The elongate jumping yellow insect about ¼ inch long is the pupa of some species of the Leaf-hoppers (*Tettigonia* Family), and most probably of *Proconia undata*, which I know to infest the grape-vine and to deposit its eggs in slits cut in the bark of the twigs. I have never known it, however, to occur in such numbers as to be greatly injurious. There are several very much smaller species of Leaf-hoppers, (*Erythroneura vitis* Harris, *E. tricincta* Fitch, *E. vulnerata* Fitch, *E. ziczac* Walsh and *E. 8-notata* Walsh,) which often swarm on grape-vines and injure them greatly, sucking the sap from the leaves till they turn completely brown. Cases are even on record where they have actually killed grape-vines.

I should not recommend you to go to the expense of buying a microscope for the practical study of insects. A good one costs a great deal of money, and a poor one is good for nothing. You will find what the opticians call "lenses" much more cheap and convenient; and what are known as "Stanhope" and "Coddington" lenses magnify enough for any practical purpose. You can procure any kind of lens you wish for from Messrs. James W. Queen & Co., of Philadelphia, whom I know to be reliable men.

J. B., Iowa.—The two caterpillars you send are the larvæ of *Datana ministra*, which seems to be increasing of late years throughout the United States, so as to be getting quite a pest. They differ from all "measuring-worms" in having their full complement of legs—sixteen—instead of having only ten, and in not "looping" or "measuring" as they walk along. Respecting this insect, see the answer to Sam'l. S. Lacy, in No. 11 of Vol. I of the Practical Entomologist, and to T. M'Graw, in this number.

Thos. Wiggins, Ohio.—The dark-brown cylindrical thousand-legged worm 3½ inches long, is rather a large specimen of the *Iulus marginatus* of Say. It is not a true insect, but belongs to a Class called "Myriapoda," all of which have a very large number of legs; whereas no true insect has more than six true legs, what are known as "prolegs" in the larvæ of moths, &c., being mere fleshy excrescences which disappear in the perfect insect. Your species feeds on decaying wood, in which it forms extensive burrows, and is perfectly harmless.

Wm. G. Morris, N. Y.—The midge about ¼ inch long, which you say often appears with you in such dense clouds as to have been on one occasion mistaken for smoke coming from a grain-stack half a mile off, is a *Chironomus*, and I believe, the *stigmaterus* of Say. The larva lives in the water and is quite harmless. In many species of *Chironomus* the larva is very worm-like and blood-colored, when it goes by the popular name of "blood-worm." You say that these midges are known on Long Island as "Merry-wings" and "Fuzz-bills," the latter name of course applying to the beautifully feathered antennæ of the males.

J. A. Lapham, Wisc.—The rat-tailed grub with the body about ¾ inch long, and the tail as long as the body, which, as you say "was found in a trough of maple-sap," is the larva of a two-winged fly belonging to the Order Diptera and the *Syrphus* family, and probably to the genus *Helophilus* or *Eristalis*. There is a larva very similar to yours, which is known in Europe to inhabit cesspools, and produces a large brown fly, that at first sight would be readily mistaken for the drone of the common honey-bee. The use of the long tail is to enable the larva to breathe, while its body is under the surface of the liquid which it inhabits. All these larvæ crawl out of the water to assume the pupa state. I have bred rat-tailed larvæ much smaller than yours to the perfect fly state; but I never met with one as large as yours. Consequently I cannot say what particular species it belongs to.

Prof. W. S. Robertson, Kansas.—The elongate, pale glaucous-green *Chrysomela* nearly ¼ inch long, which you say "is found on the Imphee in very large numbers, its usual home being a large thistle," is the *Phyllobrotica longicornis* of Say. I took three specimens of it many years ago on flowers in Central Illinois. Say credits it to Arkansas. Respecting your grasshoppers, see my Article on that subject in this number of the Practical Entomologist.

T. J. Finnie, Va.—"The large worm very like a tobacco-worm" that you say is now destroying your tomato-vines is the larva of *Sphinx 5-maculata*, a moth which is very closely allied to that of the Tobacco-worm, *Sphinx Carolina*. Respecting the "jug-handled" pupa of these two insects, see the answer to F. W. Noble, in No 11 of the Practical Entomologist, p. 113. The economical manufacture of manures is quite out of our line.

H., Ill.—What you take for a new *Aphis* infesting tame grape-vines is precisely identical with the species I have described as *Aphis vitis?* Scopoli. (See *Proc., &c.*, I, p. 299.) You say it has done much damage with you to the terminal shoots of the vines. It appears to be much more common and abundant in the Border States. (See answer to C. S. Jackson, Ky, Practical Entomologist, No. 10, p. 100.) The small moth you send is, I believe, a *Crœsia*, but it is too much rubbed and mutilated to determine even the genus with any degree of certainty. Several species of *Crœsia* are described by Dr. Clemens, in the *Proceedings*.

Peter Ferris, N. Y.—I hope you will not forget next year to send me plenty of specimens of the larva that infests your orchards, and which seems to be undescribed, or at all events cannot be recognized from your description.

ERRATA.

In Vol. I, No. 12. p. 118, column 2, line 37, for "single mammal" read "single genus of mammals."

Page 123, column 1, line 37, for "similar" read "singular."

Page 125, column 2, line 22 from bottom, for "1860" read "1840."

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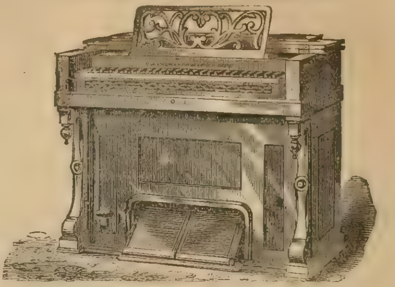

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VOL. II, No. 2. NOVEMBER, 1866. WHOLE No. 14.

The Practical Entomologist.

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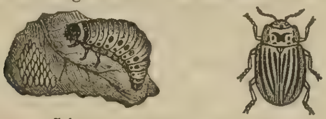
PHILADELPHIA, NOVEMBER, 1866.

THE NEW POTATO BUG.

The following figures, which are slightly magnified, give a very good idea of the New or Colorado Potato Bug, the left hand figure showing the larva and a bunch of the eggs, the right hand figure the perfect or winged beetle. Of the native home, the eastward migrations, and the natural history of this insect, I have already treated at great length. The story of its having already made its appearance in Maine was a mistake; but no doubt in 10 or 12 years from now it will be there.



Colors—cream-color and black.

It was the uniform habit of the great Napoleon, after a battle had been fought, to pass personally over the field of battle, ascertain the number of killed and wounded, and then issue his Bulletin, giving in detail the results of the contest.

Exactly 13 months ago, in the first number of the first Volume of the PRACTICAL ENTOMOLOGIST, I showed that this new and very destructive foe to the Potato, had passed from the Rocky Mountain region into Iowa, and had already crossed the Mississippi into the State of Illinois at at least five different points along a line of 200 miles. From entomological data I predicted also, that it would gradually advance eastward at the probable rate of at least 50 miles a year, till it reached the Atlantic Ocean, and that wherever it was introduced, there it would remain as a permanent colonist.

Having recently attended the Illinois State Fair, and conversed with men from all parts of the State, I am now enabled to state approximately the region of country which has been already occupied and possessed by this little pest. Not to weary the reader with a long list of counties and towns, it will be sufficient to state, that if we draw a straight line connecting Chicago and St. Louis, the country to the North West of this line, or fully one-half of the State, is already occupied and possessed by the gentleman from Colorado, and the country to the South East of it is generally as yet untouched. There are, it is true, as we might naturally expect, some irregularities in the march of this grand army; but on the whole, the above statement gives us a tolerably correct view of its progress. For example, in Putnam County, which lies a little to the Northwest of the line of demarcation, I could hear of no Colorado bugs, although plenty were found in Marshall and Bureau counties, which lie respectively south and north of Putnam; but on the other hand, in Champaign and Coles Counties, which lie considerably to the South-east of the dividing line, and are only separated from Indiana by a single tier of counties, I heard of them from several quarters; and the *Prairie Farmer* has published accounts of their occurring at two distinct points in the latter county, Milton Station and Charleston. (*Prairie Farmer*, June 30, 1866, and June 23, 1866.) I have myself received specimens from Half Day, in Lake County, which occupies the extreme North-east corner of the State and abuts on Lake Michigan; and I heard at the Fair that it had been found at Waukegan, in that county, which lies actually upon the Lake. Mr. C. V. Riley, of Chicago, has also assured me, that he himself found immense numbers of them in a large field of potatoes a little to the south of Chicago; and that even so early as 1865 a few specimens were caught in that vicinity.

Hence, if we assume that it was the column that, as I have shown, crossed the Mississippi at Warsaw in 1864, that marched upon Champaign County, it must have travelled about 150 miles in two years, or at the average rate of 75 miles a year, instead of 50 miles a year, as, to be on the safe side, I had originally calculated. But the probability is, that the insect really crossed the river in 1863 in very small numbers, so as not to be noticed by farmers, a few specimens accidentally lighting upon wagons about to be ferried over into Illinois, and thus effecting their passage without wetting their wings. Some few also might have been blown into the river by a westerly wind, and carried over to the Illinois shore by the same cause. For, like almost all insects, they will come to life again after a very long immersion in water. Still, it must be evident that, to ascertain the rate at which the insect really marches, we ought only to take into the account its first occurrence in noticeable numbers at any given point. On the whole, we might say, in military phrase, that they are marching through Illinois in many separate columns, just as Sherman marched to the sea, but always "refusing the right flank." They do not appear to have as yet invaded Egypt or the extreme south point of Illinois, the southern columns of the Grand Army lagging far behind the northern columns. In Missouri, Mr. Huron Burt says, that they made their appearance in Calloway County, which is about 80 miles west of St. Louis, in 1865; (Colman's *Rural World*, Sept. 15, 1866;) and Mr. Carew Sanders says that he himself observed them for the first time near St. Louis in 1866. (*Ibid.* Sept. 1, 1866.) They are also recorded as having appeared "in great numbers," and so as to be very destructive, in 1866, at Hannibal, Mo., a town which lies on the Mississippi, over 100 miles above St. Louis. (*N. Y. Sem. Tribune*, August 10, 1866.) Hence, we may infer that they must have infested that point in smaller numbers in 1865; for uniformly, wherever this insect has prevailed, the second year's crop of them has been much larger and more generally destructive than the first year's crop. As to the State of Iowa, we may consider it as fully subjugated, possessed and occupied by the enemy; and as that enemy first invaded it in 1861, and has never hitherto, so far as I can find out, given up a single post that he has once occupied, we may reasonably infer that he will pursue the same course in other subjugated States; and that our remotest descendants will continue for all time to suffer from his ravages. Of course, as with all Noxious Insects, the Colorado bug will be worse some years than others, from the complex and varied operation of the various insect foes that prey upon it, and of the other insect foes that prey upon these last, wheel within wheel, check upon check, and countercheck upon countercheck. But that we shall always have the Colorado Bug in smaller or larger numbers among us, I have no more doubt, than that we shall always have more or less thunder-storms every year in the Valley of the Mississippi. With regard to Wisconsin, it appears to have crossed the Mississippi into Grant County, in the South-west corner of the State, but in what year is not specified; (*Wisconsin Farmer*, July, 1866;) and to have also occurred at various other points, not far from the southern borders of the State, in 1866. (*Ibid*, July and August, 1866.) As to its occurrence in 1865 in Mosinee, Wisconsin, (which is in Marathon County, towards the middle of the northern borders of the State,) as referred to in my former article, the fact needs further confirmation. Possibly Mr. Priest mistook the old Potato Bug for the new one, and when they disappeared from natural causes, supposed that his turkeys had eaten them all up.

All accounts seem to agree that neither lime, nor ashes, nor any available external application is of the least use in checking the depredations of this insect. The *Prairie Farmer* says that "Mr. Jones found, after many experiments, that neither hot lime, lime-water, brine, tobacco-water, wine (?) nor sulphur had any effect on them; that turpentine, benzine and kerosene would kill them when copiously applied, *but also killed the potatoes*," and that "coal-oil mixed with water is ineffectual." (*Prairie Farmer*, June 30, 1866.) Although there is some contradictory evidence, yet the general result of all the testimony is, that neither domestic fowls, nor ducks, nor turkeys will eat them, at all events to any very extensive amount. Indeed they appear to be, to a certain extent, poisonous, at least to the human species. For I was informed by a very trustworthy gentleman at the State Fair, that a whole family were taken sick in consequence of using water, in which only three of the insects had been accidentally boiled; and that his own wife, after scalding a pailful of them and inhaling the fumes from their bodies, was prostrated by a severe illness which confined her to her bed for several days. Be this as it may, it is well known to Botanists, that the family of plants upon which this insect exclusively feeds, contains many genera of a more or less poisonous nature (Nightshade, Henbane, Tobacco, &c.), and it was long ago asserted that the water in which potatoes are boiled is unwholesome. Hence, for those who grow potatoes in a small way, we are thrown back upon that most universal and infallible of all remedies against our Insect Foes—hand-picking, whether in the egg, larva or perfect state, and brushing them into pans. But even this remedy, in cases where one's neighbors grow potatoes and allow the insect to increase and multiply without let or impediment, sometimes becomes practically unavailable, or in other words "costs more than it comes to." I know of several cases near Rock Island, Illinois, where the owners of potato-patches, after persevering in a course of hand-picking for fully a month, finally gave up in despair, because as fast as they killed off their own bugs, a fresh supply from their neighbors' potato-patches kept flying in upon them. Indeed, so migratory are these insects in their habits, that I have scarcely taken a single walk in any direction this summer, without seeing one or more of them, either flying across my path, with their beautiful striped wing-cases and rose-colored wings glittering in the sun, or crawling on the ground, or lit upon fences, weeds, &c. It really seems a pity, that like a certain portion of the fairest part of the creation, they should be at one and the same time so beautiful and so mischievous. I may add here that the Peach-blow variety of potatoes is less liked by these little pests than any other, and that so long as there are other kinds to feed on they will not feed on the Peach-blows. Of course I am speaking here of the Bugs and not of the Ladies.

But although hand-picking will probably still continue the only effective remedy, for those who grow potatoes on a small scale, yet, for extensive growers, machinery can be called into play to destroy the Bug. A horse-machine for this purpose has already been invented in Iowa; and even if this particular machine does not prove effectual, there can be no doubt that it may be finally improved, so as to answer completely the purpose for which it is intended; just as the old original Reaping and Mowing Machines have, of late years, been so greatly improved upon, that no farmer now would take one of the old-fashioned Machines at a gift. Having heard of the above Machine at the State Fair, and been referred to Dr. James Weed, of Muscatine, Iowa, for further information, I wrote to that gentleman on the subject; and having seen the operation of the Machine with his own eyes, he has obligingly furnished me with the following account of it. It is, I believe, the first that has hitherto appeared in print:—

> The machine was invented by Mr. Benson, cf Muscatine, Iowa, and he intends manufacturing it for next season's use. The cost will be about thirty dollars. It consists of a frame-work, which moves astride the row of potatoes, on which is mounted longitudinally a reel somewhat like the one on McCormick's old Reaper, which knocks the bugs off the plants into a box on one side. This box is of course open on the side next the row nearly down to the ground, but is some two feet high on the outside and at the ends. The reel works over the inner edge of the box, and the bugs are whipped off the vines pretty clean; and the most of them are thrown against the higher side of the box, which converges like a hopper over two four-inch longitudinal rollers at the bottom, between which the bugs are passed and crushed. These rollers are some three or four feet long.
>
> Those insects which are perched low down on the plants are frequently knocked on to the ground; but I think they would soon crawl up again; and repeating the operation at intervals would very greatly reduce their numbers, and lesson very much the labor of hand-picking, which I think would be advisable in conjunction with the use of the machine, in order to destroy the eggs and diminish the young brood, which is most destructive to the foliage of the plant.

We give Mr. Benson the benefit of the above notice of his Machine gratuitously. Of course, when his terms and prices are finally fixed, he will know enough to advertise what he has got for sale. The world certainly does move. Who would have believed fifty years ago, that in the year 1867 we should be slaying Bugs by Horse-power?

It may be as well to warn the people of Michigan, that the new Potato-bug will probably invade their State sooner than it does Indiana. I know from personal observations—and the Chicago entomologists are well aware of the same fact—that many insects not usually found in Illinois, but common in Michigan, are washed up on the Lake shore near Chicago in very large numbers by easterly gales, and come to life again in spite of their apparently drowned condition. Hence, as the new Potato-bug is now quite abundant in that part of Illinois, which abuts on the western borders of Lake Michigan, it is reasonable to infer that westerly gales have already carried a few specimens into the State of Michigan; and that it will not be long before these few specimens "increase and multiply and replenish the earth."

Let us now endeavor to calculate the pecuniary damage so far inflicted by this insect upon the country. Upon inquiry I find that the average wholesale price of potatoes, in the infested district, has been in the year 1866 about 70 or 75 cents a bushel, and at Indianapolis, in Indiana, about 45 or 50 cents, being a difference of 25 cents a bushel. Manifestly the difference in price could not be much greater than this; for if potatoes fetched say only 20 or 25 cents in Indianapolis, they would be shipped from that point into North-western Illinois, until the difference in price did not materially exceed the cost of shipment from one point to the other. Hence, it follows that the above difference in price, but for the modern facilities of shipment from one part of the country to the other, might possibly have exceeded 25 cents a bushel; and that this estimate must be rather below than above what it would have been, if we had no great Rail-road system in the West. Now, the season having been about the same, so far as I am aware, in the infested district and in Indiana, and the soil and climate being about the same, the above enhanced price can only have been caused by an artificial scarcity produced by the ravages of this insect. Let us assume that the whole of Kansas and Iowa, one-half of Illinois, a fourth part of Wisconsin, and a tenth part of Missouri, form the infested district for the year 1866. If, from the U. S. Census Report for the year 1860, we take the entire potato crop of Kansas and Iowa (283,968 and 2,700,515 bushels), one-half of that of Illinois (2,899,982 bushels), one-fourth of that of Wisconsin (962,126 bushels), and one-tenth of that of Missouri (199,085 bushels), we shall find the sum total to be 7,045,976 bushels, which represents the total potato crop of the present infested district for A. D. 1860. Suppose that this amount, instead of largely increasing from 1860 to 1866, as in the ordinary state of things it would do, has, in consequence of the ravages of the new Potato Bug, remained nearly stationary. Then it results that in the infested district the consumer has had to pay in 1866, on about seven million bushels of potatoes, an enhanced price of 25 cents a bushel, in consequence of the presence of the new Potato Bug—making a total loss to the consumer of 1¾ millions of dollars, in one single year, and in one small corner of the United States; which loss has been inflicted by one single insect, out of the scores or rather hundreds that attack the Farm, the Garden, and the Orchard. Of course, it must not be imagined that the loss of the consumer is here the gain of the producer. For although the farmers in the infested district get an enhanced price for their potatoes, yet their crop is so much lessened in quantity, that on the average they gain nothing at all, many of them actually losing their entire crop, although individual farmers, whose crop happens to have escaped the scourge, do, of course, gain by the enhanced price.

The whole potato-crop of the United States, if it continues to increase at the same rate as it has hitherto done, will be in the year 1880 about 186 millions of bushels. Suppose it is only 100 millions of bushels in 1880. By the year 1880, at the latest, I have calculated that the new Potato Bug will have reached the Atlantic Ocean and occupied the whole country. Whence it follows that an enhanced price of 25 cents a bushel on the greatly reduced crop of 1880 would foot up *twenty-five millions of dollars;* and that, judging of the future from the past and the present, we may anticipate some such enhanced price, in consequence of the continued migrations of this insect. And yet we are often told by men, who never look two inches beyond the tips of their own noses, that insects are little contemptible vermin, unworthy the notice of any grown man! B. D. W.

The Canker Worm.

I have already in sundry "answers" to Correspondents expressed my belief, that the reason why tarred bandages were found an insufficient protection against this insect was, that *they were not applied early enough in the season.* All the best authors say, that many of the wingless female moths come out late in the autumn, and even on fine warm days through the winter; and consequently that the tarred bandages, or the leaden troughs full of oil, or the Patent Protectors, or whatever else you use to prevent the female moths from climbing the trees to lay their eggs thereon, must be applied as soon as these female moths begin to come out. The following extract from an Article on the Canker-worm by Col. D. S. Dewey, of Connecticut, shows that he, at all events, made the mistake above referred to. Like some unreasonable patients, he does not take the medicine at the time that the Doctor orders it to be taken, and then blames the poor physician because he is not cured.

> Failing as above stated, in my review of the volumes of the HORTICULTURIST, to find printed testimony, recourse was next had to parole evidence. The only knowledge thus attainable was that tar was *the* remedy. So, tar it was; and, for sixteen successive evenings, (COMMENCING MARCH 17, 1865,) the application was faithfully made, upon some sixty choice apple trees. Many neighbors followed suit; "any quantity" of grubs were caught; but the result uniformly showed a perfect waste of time and money.—*The Horticulturist*, July, 1866.

Col. Dewey will probably say, that it is altogether too much trouble to tar his trees both spring and fall and on warm days through the winter. Perhaps it may be so. Very well. Then let the Canker-worm take his natural course, and see if he does not ruin all your trees in three years. Perhaps the medicine is too nauseous to swallow. Very well. Then throw it out of the window and see if you will get cured without it. But do not be unfair enough to halve the dose, and then blame the physician because he does not cure you.

But IS it too much trouble to tar all the trees in an orchard according to the most approved directions? or, to speak more rationally, will it pay, as a question of dollars and cents? The Colonel can calculate better than I can, what is the money value in Connecticut of an average crop of apples from sixty average trees, less the expense of harvesting and marketing and the rent of the land they grow on. He can also calculate what will be the money cost of tarring sixty trees, say, to be on the safe side, ninety different times. I take it the apples will out-foot the tar at least ten-fold. And if he can only persuade his immediate apple-growing neighbors to follow the same plan, honestly and faithfully, for one or perhaps two seasons, he will—provided there are no forest-trees in his immediate neighborhood afflicted by the Canker-worm—be rid of this pest probably for half a lifetime. For the Canker-worm Moth cannot fly in upon him from the other end of the county, as the moth of the common Caterpillar (*Clisiocampa americana*) would do, if he and his immediate neighbors were honestly and faithfully to destroy every single caterpillar-nest on their trees for one or two years. "Curst cows have short horns;" and the female Canker-worm Moth cannot fly at all.

Another thing. It is demonstrable that the Colonel is in error when he asserts, that applying the tar, even in the perfunctory manner he adopted, was "a perfect waste of time and money." He expressly says that the tar stopped "any quantity of grubs," (meaning, I suppose, the female Canker-worm Moths,) from climbing the trees. Now if there had been no tar on his trees, all these hateful "grubs" would have mounted his trees and laid their eggs there, and instead of measuring his Cankerworms by the bushel, he would have had to measure them by the wagon-load. Even half a dose of quinine will help the ague a little; but that is no reason why, when the physician orders a full dose, the patient should, out of wilfulness, or conceit, or sheer carelessness, take only half a dose, and then grumble because he is not completely cured. B. D. W.

The Cankerworm Again.

The Secretary of the Michigan State Agricultural Society, finding that "that pest of apple-orchards in Eastern Massachusetts, the Canker-worm, has been colonized in Michigan," writes to the *New England Farmer* for advice as to the best mode of attacking it. In reply, the Editor of the *Farmer* states that "tarring the trees *is* effective, if it is effectually done," i. e., as is afterwards explained, if the process is continued "from November to April." He thinks, however, that oil and rosin, boiled together in certain proportions which have to be ascertained by "the rule of thumb," answers a better purpose than tar, because it does not dry up so much on hot days, and therefore does not require to be renewed every day as tar does. On the other hand he says that "he is not aware that any Tree-protector has proved *entirely* effective in preventing the ascent of canker-worms."

But although the Editor of the *Farmer* concedes that tar, properly applied, prevents the female moth, or the "grub" as he calls it, from climbing the tree to lay her eggs thereon, yet he afterwards gives up tar, rosin and oil, and all the Patent Tree Protectors as unavailable, and actually advises the Michigan folks to cut down, burn and destroy all their infected trees from one end of the State to the other, by virtue of a special law to be passed for that purpose, "even if it takes all summer and *every militia man in the State* to execute the order." And what is the reason assigned for such a course? Simply this:—

> Those grubs which do not ascend must and will lay their eggs somewhere—upon the bark of the tree beneath the protector, or upon something else. This spring, eggs thus deposited were hatched in countless numbers; and although the worms were at first scarcely more than a sixteenth of an inch in length, and not so large as a cambric needle, *they immediately ascended the tree in swarms;* the glass grooves [of the protector] being, of course, no impediment to their march.

Now I must candidly confess that I should not have anticipated this; and it certainly is most surprising that larvæ, which Nature intended to hatch out on the twigs of the tree on which they feed, should, when compelled by man to hatch out on the ground, know enough to seek out the trunk of the tree and then climb it and pass on to the twigs, their normal station. Still I have no reason to doubt the fact. But what then? We have effectually stopped the Mother-moth from laying her eggs on the tree by tarred bandages. Will not the same tarred bandages, if daily renewed through the hatching time, stop her children also from climbing the tree? Most certainly they will, if only proper care be taken to whip the bandages fast to the tree, so that even the minutest larva cannot crawl under them. And if the tar is applied directly to the bark, without any intervening bandage, as appears to be the usual practice in Massachusetts, of course there is no possibility of their surmounting the obstacle.

To head the Cankerworm, therefore, effectually, the trees must be tarred afresh every day from the latter end of October to the middle of May or to about the time that the apple-leaves are completely put forth, omitting to do so on cold days in the dead of winter. Call the whole nett time 150 days, to be on the safe side. A man could certainly tar 100 trees in an hour, which would make 150 hours or fifteen days' work for saving the Apple-crop of 100 trees. Put work as high as you please, and apples as low as you please, and the operation, viewed as a question of dollars and cents, is most certainly a paying one.

Instead of advising the Michigan Legislature to pass a law for cutting down and destroying all trees infested by the Canker-worm, why not advise them to pass a law compelling the owners of infested trees to tar them as above specified? Or—better still, because more certain to be effectual—to pass a law organizing a paid corps of men in the infested districts to do the work? *There would then be no occasion to call out the militia.* A man might shoulder his rifle, if he saw the Sheriff and his posse coming, axe in hand, to cut down his orchard; but he would only laugh, when he saw them charging double-quick upon his apple-trees, with presented tar-brushes.

B. D. W.

THE GRAPE LEAF GALL-COCCUS.

(*Pemphigus vitifoliæ* Fitch.)

BY HENRY SHIMER, M. D.

It is more than three years since my wife first called my attention to a few galls on her grape-vines, in the grounds of Mt. Carroll Seminary. Since then I have been a close observer of the Coccus, that inhabits the gall and its enemies. Now, as the insect is making its appearance in other parts of the West, in vineyards, and attracting a good deal of attention, it occurs to me as not improbable that some extracts from my notes might be of value to the public.

The galls when first observed here were few, but have constantly increased up to the present time. Generally early in June a few scattering galls can be seen; but by the last of June and early in July they become very numerous. In August they appear in unnumbered millions, so that the young leaves turn black, die and fall off, from exhaustion of sap, even before the gall is fully formed.

This is the fourth year of their presence here, and the leaves are covered with galls—often 500 to 1000 galls on a single large leaf. They breed with alarming rapidity. Mr. Walsh, in his answer to correspondents in the 11th number of the PRACTICAL ENTOMOLOGIST, makes quite a generous estimate of the breeding capacity of this insect—"50 eggs on a rough calculation." I have many times made a very close estimate by counting; and although sometimes I find as few as he does, yet more frequently I find many more—as for instance July 27, 1865, 500 eggs in a single gall, the parent so full as not to be able to move, and laying continually, the act of ovipositing actually observed. August 15, 1865, upon examining some of the best developed galls, not visited by enemies, I find by counting and close estimation, over 5000 eggs and young ones just hatched, in a single gall with but one parent insect; [1] and as the young are constantly leaving, to say that each parent becomes the mother of 10,000, and in another month grand-mother to 100,000,000, is, if at all incorrect, below the true estimate; and as they produce about five perfect generations in one season, it needs little mathematical knowledge to see that one parent, not affected by enemies and other misfortunes, will, in a single season, become the progenitor of 10,000,000,000 000,000—a number sufficient to encompass the earth 1,250,126,277 (over one and a quarter billion) times; and allowing that we crowd 50 into a square inch, enough to carpet all the land portion of the earth from pole to pole. And all these, under the most favorable circumstances, might be produced from one of these insignificant, lice-like, almost microscopic creatures. From such reflections that figures force upon our consideration, (and "figures don't lie,") we can easily learn to appreciate the importance of destroying, if it be but one noxious insect; and much more of preserving and fostering as our own life its insect enemies.

This year, by the middle of July, I saw the second young brood of coccus, by the aid of a glass, so numerous as to literally cover the upper side of the young expanding leaf, while its sides were yet folded together. In these cases they formed no large galls, but the exhausted leaves soon died; and now, many limbs are entirely devoid of leaves for a foot or two near the end, a few young leaves still struggling into existence from the buds near the tip. The young coccus is quite an active traveller for this variety of insect. I saw the young leaves densely populated, on side branches of the vines, when no parent galls were within ten or twelve feet of them. When two or more young coccus happen to locate close together, the two original galls blend into one oblong perfect one. But this can only occur, as I have observed a thousand times, when the coccus are not so numerous as to be closely clustered together on all sides. A single leaf is not often able to form more than about 500 galls. When it much exceeds this, nature yields as before observed, and the insect by its excessive multiplication proves its own destruction in the destruction of the plant.

The tendrils, leaf stalks and tender branches, are not exempt from the attacks of these insects. I have now before me a number of limbs, embracing two or three feet of the end of the vine, all covered with fleshy wart-like galls, usually elongated lengthwise of the limb, others quite similar to those on the leaves, with such differences as situation establishes. On the leaf the gall is formed by the irritated surface receding away from the insect, and an abnormal cell-growth on the opposite side of the leaf; while in the limb the very necessity of the case prompts a modification of this same effort on the part of the vine; the bark thickens around the coccus, and forms a juicy, irregular wart, with the gall usually open on the top, the sides being much thicker than the leaf gall. From a close microscopic examination, I am not able to detect any essential difference in the insects themselves, as found on the leaf, stem, tendrils or limb. The tendril is more pliable than the limb, and here we see, as in the leaf, the same abnormal growth and thickening on the opposite side, whence it curves partly around the insect. The cavities in these galls are not so roomy as in those on the leaf, and we find fewer eggs and young; but the eggs and young, as well as the parents, are in all respects similar to those on the leaf.

Furthermore, from my observations, I am of the opinion, that the few that escape from their enemies on the tendrils and limbs late in the fall pass the winter in the gall, and are ready for operations on the tender leaves in the spring. The limbs, especially where the leaves have died and fallen off, are almost covered with black, rough scars. This is produced by the insect from some cause failing to develop, the succulent, warty limb-gall either falling off accidentally or being destroyed by its natural enemies. For on the limb, it will be observed, as well as on the leaf, that the presence of the insect is necessary to the continuance of the gall; and as soon as the insect is outside, the gall ceases to grow; and if already fully developed, partly opens as the vine attempts to restore the injured part, and, as a natural consequence, leaves a blackened scar.

Mr. Walsh, in the PRACTICAL ENTOMOLOGIST (Vol. I, p. 112), gives it as his opinion, that the galls on the tendrils are made by a different species of bark-lice.[2] Those that I have always observed on the tendrils and tender limbs, for two or three years past, appear to agree with his account of his supposed new species. If they do, I am inclined to think that, after studying them three or four years, he will refer them to the same species; for if he constructs a species for those on the tendrils, he must also construct another for those on the limbs. He gives it as his opinion that they will not prove injurious, and may perhaps be beneficial. I sincerely hope he may be correct, but fear that they will prove to be to the grape what the apple bark-louse is to the apple tree—its most deleterious enemy; and if I were buying I would no more think of purchasing grape vines from a nursery with the grape-leaf coccus, than I would apple trees from one having the apple bark-louse. My reasons for this are not without foundation. Since I first knew them, they have held right on through every adversity with a steady increase, and to-day are much worse than I ever saw them before. They endure the most severe winter weather without protection.

The most important question practically is, what are the agents that may be brought to bear against them, to hold them in check?

They resolve themselves into two:

First. Man—he can do something, though the smallest part of the work, by gathering up and burning all his trimmings, in the fall, winter or spring, when this work is done, and by raking up the leaves and burning them. For it is not impossible that some eggs may be in the leaf galls, late in the fall, after the weather becomes too cold for hatching them; (though last fall I made close search on the 1st of October, and found all empty that I examined;[3]) any thus passing the winter in the dead leaf on the ground would hatch in the spring, and the young insect, in its wanderings in quest of food, might reach the vine stalk and then the young leaf.

Second. Insect Enemies. These are far the most efficient agents; and it is one of the most interesting themes to witness the strife for life upon a grape leaf. I have observed some half dozen or more enemies, some of them very efficient. Mr. Walsh speaks of an orange colored larva from which he bred a small fly. He gives no account of the fly except its size.

I found last summer a whitish larva with a faint yellowish tinge in great abundance; the pupa is brown, with an oblique flattish point at one end.[4] From this I bred a small gray silver-colored fly, kindly determined by Baron Osten Sacken to belong to the genus *Leucopis*. This is a valuable enemy, and would prove very efficient were it not for a minute species of chalcis fly, that preys upon it while it is eating the eggs of the coccus; thus doubly verifying the law of "eat and be eaten." Last year I bred twenty of them to one fly; this summer the larva of the fly is not so abundant. I also saw a deep yellow, orange-colored larva, from which I bred quite a different and unknown insect. It is comparatively rare here.

A very minute almost microscopic black ichneumon feeds upon the coccus. Rare; I have only one specimen.

A small heteropterous insect, probably undescribed, also preys upon the coccus, and is moderately abundant.[5] I have seen its small light purple larva in the gall, both last summer and this, as well as on the outside of the leaf, sometimes in colonies. One of them I bred to the perfect state by feeding it one month with the coccus.

By far the most important enemy is a very small species of the *Coccinellidæ* or lady-birds. They are very plenty in both larval and perfect state. I have frequently found the larva in the galls, as well as crawling about over the leaf, visiting the different coccus families, as its necessities demanded. Its abundance and comparative freedom from parasites make it the most important of all the enemies that I have found among the coccus. The bodies of the larva are covered with a cottony secretion looking like white fuzzy bands encircling each segment. They evidently belong to the genus *Scymnus* and correspond with *Scymnus terminatus* (Say), an insect described as inhabiting Louisiana.

The larvæ of "the golden-eyed lace-winged fly" (*Chrysopa*) can usually be found feeding upon them, from which I have bred *C. plorabunda* Fitch, and an undescribed species remarkable for the great length of its antennæ and general paleness. These *Chrysopa* generally are doing a good work, but are considerably restrained by an ichneumon parasite.

NOTES BY BENJ. D. WALSH.

1. Dr. Shimer estimates that he found "over 5000 eggs and young ones just hatched, in a single gall with but one parent insect." Either his galls are larger than mine, or his eggs are smaller than mine, or, which I rather infer, there is some error in his calculation. On carefully measuring the eggs and the largest galls I have been able to find, I calculate that it is impossible to pack more than 700 eggs in any gall, besides the mother-louse. Moreover, I have almost always found more than one mother-louse in the large-sized galls. Probably 200 eggs on an average to every female louse would be not far from the mark.

2. I have observed tendril-galls on the Clinton grape-vine, that I believe to be produced by the same insect as the leaf-galls. The tendril-galls, which I spoke of in the passage referred to by Dr. Shimer, were said by my correspondent to occur on a foreign grape-vine which bore *no leaf-galls at all*. Whether these are produced by a distinct species of *Coccus* is another and a very different question. I think it not improbable, however, from the very great similarity of these tendril-galls to those on the Clinton grape-vine, that they are not.

3. On October 1st, I found as many as five of these leaf-galls to contain a mother-louse along with eggs and young larvæ; but this was exclusively on the small terminal leaves. As the larvæ hatch out through the summer, they keep perpetually passing on to younger and younger leaves to establish new galls, so that the old leaves, by the end of the summer, become entirely free from bark-lice, and the old galls gape widely open and partially dry up.

4. The pupa of *Leucopis*, according to European authors and my own observation, has *two* oblique processes, (not *one*, as stated by Dr. Shimer,) growing from its tail, as in many Syrphidous pupæ. Dr. Shimer says that "I gave no account of this fly, except its size." I distinctly stated that it was a two-winged fly belonging to the great *Musca* family. (PRACTICAL ENTOMOLOGIST I, p. 112.) See further on this subject in the Answer to E. Daggy, in the PRACTICAL ENTOMOLOGIST II, p. 8, and to W. H. S. on page 9 of the same volume.

5. The "small heteropterous insect," spoken of as preying upon the *Coccus*, is probably a *Thrips* which genus has never been referred by any author to Heteroptera, though Latreille places it among the Homoptera. By Westwood and others the *Thrips* family are considered as forming by themselves a separate Order. I have noticed many of them in and about these galls both in the larva and in the perfect state, and I am now fully satisfied, from repeated observations in regard to a great variety of galls, that *Thrips* is a cannibal insect, and not a vegetable-feeder as all authors had previously supposed. (See *Proceedings*, &c. III, pp. 611—2.) There is no "small heteropterous insect" known to me that is a cannibal, all those belonging to this Order that are really cannibals being of some considerable size.

Since the above paper of Dr. Shimer's was forwarded to the PRACTICAL ENTOMOLOGIST, that gentleman has published in the *Prairie Farmer* (Nov. 3, 1866) an account of the winged male obtained from these *vitifoliæ* galls. I have been refused permission to inspect one of his specimens, but from the paper itself and from an examination of a specimen made at my request by Mr. Cresson it results that this insect must form a new and somewhat anomalous genus belonging to the *Coccus* family. The tarsus is one-jointed, but it is stated that there are two distinct tarsal claws; and there are four wings, the hind pair much the smallest and devoid of veins, the front pair with a "costal" or rib-vein only, which Dr. Shimer erroneously calls the "discoidal nerve," and which emits, according to that gentleman, "a long longitudinal branch" very obscurely developed. Misled by the unusually full development of the hind wings, and by the presence of two tarsal claws—though by the way, I can myself discover but a single tarsal claw in the wingless female, under an excellent Coddington lens—Dr. Shimer proposes to establish a new Family, intermediate between the *Coccus* and *Aphis* families, to contain his new genus, to which, however, he has as yet assigned no name. But in all known males belonging to the *Coccus* family, the hind wings, as in Diptera, are represented by balancers (halteres), and the more complete development of these balancers into a small pair of hind wings is not sufficient ground for the establishment of a new Family. We might as well, because in the generally four-winged *Ephemera* family, some *Clöe* and all *Cœnis* have not even the slightest vestiges of any hind wings, make on that account a new Family out of them. Again, the presence of two tarsal claws, instead of a single tarsal claw, is not sufficient ground for the establishment of a new Family. For in many Families of insects, which no one ever yet dreamed of cutting up on that account into two families, for example, in the *Pselaphus* family among the Beetles, some genera have two equal tarsal claws and some but a single tarsal claw. On the other hand the one-jointed tarsus is a character of much higher value, and coupled with the neuration of the front wing, which, so far as can be ascertained from a very loose and indefinite and inaccurate description, unaccompanied by any figures, is nearly identical with that of *Coccus*, forms good and sufficient grounds for referring this insect to the *Coccus*, and not to the *Aphis* family.

In his paper in the *Prairie Farmer*, Dr. Shimer erroneously quotes me as referring this grape-gall insect to the genus *Coccus*. What I said was merely that it was "a true bark-louse belonging to the *Coccus* family," which is a very different thing from the assertion which he puts into my mouth. He is also altogether wrong in assuming that all bark-lice inhabit the bark; for the *Coccus Hesperidum?* so often found on the Oleander, inhabits the leaves, and yet no entomological purist has yet been found absurd enough to call it, on that account, a "leaf-louse." One might as well insist on it that the common Bed-bug ceases to be a Bed-bug when, as I have known it to do, it quits the beds of christian folks, and infests Hen-houses in enormous numbers.

I had previously been under the impression that no species belonging to the *Coccus* family were known to produce galls upon plants; but Baron Osten Sacken has kindly informed me, that in the Transactions of the Vienna Zoological and Botanical Society there is an account of various galls produced by true Barklice in Australia, "some of which Barklice are an inch long, the males producing galls of different shape from those of the females, and other odd things." Westwood also refers to the enormous size of certain Australian Barklice. (*Introd.* II, p. 450.) We may be thankful that our species are of more moderate dimensions. Fancy all the barklice on a badly-infested Apple-tree suddenly becoming an inch long!

The Striped Bug.

By A. of Quincy, Mass.

In the last [Aug. 1866,] number of the PRACTICAL ENTOMOLOGIST, I saw an article on the striped cucumber-bug, in which the writer recommended as a protection to the vines, a frame of "four short pieces of board, nailed together in the form of a bottomless box and roofed over at the top with musketo-bar." I can tell you something better than that. As soon as the bugs begin to attack the vines, sift or sprinkle plaster of paris over the vines. This will keep the bugs off, as they cannot alight on the plaster. If they do, they cannot rise again, for it sticks them to the spot like glue. I have tried this remedy for 12 years and have never known it to fail. If it rains and washes off the plaster, sift it on again as soon as it is done raining, and keep it on until the vines get so large that the bugs cannot hurt them.

Remarks by B. D. W.—As one of our largest market gardeners at Rock Island uses the above plan, I presume that it does some good. But that it is not so effectual as A. represents it to be, I have seen with my own eyes. For although every hill of vines was dusted with plaster in this gardener's field, I found him in the spring of 1865 commencing on the windward side of the field and driving the Cucumber bugs before him like so many Quails. Of course, if the plaster had been an effectual remedy, he would not have taken all this trouble.

Doctoring Fruit-trees.

The following is from the proceedings of the N. Y. Farmers' Club, as published in the *N. Y. Sem. Tribune*, Oct. 23, 1866:—

> *Apple Tree Borers.*—JOHN THOMPSON, jr., Rochester, N. Y., proposes to extirpate borers by boring three or four holes with a large gimlet into the sap-wood of the tree, then put into each hole a grain of blue mass, fill up with sulphur, and cork, and finaliy seal over with wax. The idea is to medicate the sap, so as to make it disagreeable to the insects. He says: "By the use of sulphur I have found a way to check them.
>
> "*Blight in Pear Trees.*—Besides inserting the sulphur, I drove about a dozen cut nails into the body of each tree. I intend to try calomel upon my peach trees."

And why not try jalap too? And rhubarb? And ipecac? But be careful not to give too large a dose of Blue Mass or of Calomel, or you may salivate your trees. Clearly, Mr. Thompson, jr. does not read the *Practical Entomologist.*

Beetles destroying Corn.

[From the *Rural American*, July 15. 1866.]

MR. MINER:—Knowing that you are interested in anything connected with agricultural pursuits, I take the liberty of sending, for your inspection, a few specimens of small beetles, taken out of three hills of corn. They burrow down in the hill, and attach themselves (head downwards) to the young corn, about two inches below the surface of the ground, and insert their proboscis into the corn plant, and suck the juice until the blade turns blue and dies. I find from one to five of them in each hill. One of my neighbors has lost eight acres of corn (old sheep pasture) by them. If you can suggest anything to stop their ravages, you will confer a favor on several subscribers to the RURAL AMERICAN.

Hannibal, N. Y. JAS. M. MANKS.

REMARKS.—The small beetles sent to us are an insect with which we are not acquainted; but perhaps some of our subscribers can throw some light on their depredations and a remedy.—ED.

If Editors in the above predicament would send us the insects with which they are "not acquainted," we would cheerfully give their names and any other information about them that we could furnish. How can "Subscribers" tell what beetles are spoken of, when all that is said about their size, shape, sculpture or color is that they are "small?" But are they really beetles? If they have a "probocis" and "suck sap," they must be "Bugs" and not "Beetles." By some unaccountable perversity, people will persist in calling "Beetles" "Bugs," and now it would seem that "Bugs" are dubbed "Beetles." Just so amongst the peasantry of the County of Dorset, in England, toads are called "frogs" and frogs are called "hop-frogs." B. D. W.

ANSWERS TO CORRESPONDENTS.

Isaac Hicks, N. Y.—You say that, according to the description of the larva of the Native American Gooseberry Sawfly, (*Pristiphora grossulariæ,*) given in the PRACTICAL ENTOMOLOGIST, No. 12, you had it on your currant bushes in the nursery last year, but not this year. This is an important fact, as showing the presence of this insect in the East as well as in the West. You remark further that persons living in Otsego and Onondaga Counties, N. Y., told you that their currant-worm was a measurer. Of course, therefore, it must have been the *Abraxas? ribearia* of Fitch, spoken of in the PRACTICAL ENTOMOLOGIST, Vol. I, p. 122, and which is now called *Ellopia ribearia.* It was by an error of the printers that you were stated to have tried the "sulphur cure" on your peach-trees in 1860, instead of 1840. (PRACTICAL ENTOMOLOGIST, I, p. 125). The insects with long antennæ, and a few of them having wings "banded with light and black or slate-colored bands," which you saw huddling together in clusters of 50 or 100 on the trunks of large trees, were probably the *Psocus venosus* of Burmeister, which has that remarkable habit, and sometimes marches in large dense groups up and down the trunks of trees like a regiment of soldiers. This species belongs to the *Psocus* family in the Order Neuroptera—the same family to which the minute book-lice belong, which are often found in books, collections of insects, &c., and feed on dead animal and vegetable substances. It is, however, only about ⅓ inch long, including in the measurement the closed wings, and you describe your insect as ½ inch long or more. But perhaps on this point you trusted to your general recollection of the insect.

Calvin Ward, Vermont.—You complain of a "small worm, almost ¼ inch long, of the size of a common pin in diameter, with no appearance of any legs, the color of the pulp of the apple and with a little black on the top of the head," that bores your apples in all directions. When taken out of the apple and placed upon the window-stool "it moved," you say, "very slowly, either end first." You further remark that "this insect does more injury to you than all other insects combined," and that "in 1865 it injured your apples to the extent of one-half their value, though it is not the only one that preys on them, but that it has not been so bad in 1866."

From your description this larva is evidently not the common "apple-worm," the larva of the Codling Moth (*Carpocapsa pomonella*); for that larva is much stouter and has got distinct legs. I suppose it is the larva of a dipterous insect, or two-winged fly, previously unknown to entomologists, which, as I am told, has been discovered by Dr. Trimble to infest the apple in the way that you describe; and which occurs also in the apples of Mr. Isaac Hicks, of Long Island, New York, as I am informed by that gentleman. I have not yet seen Dr. Trimble's book on Insects Injurious to Fruit-trees, and do not know whether this Fly is there named and described, or whether any remedies are there pointed out to lessen its depredations. Of course, not knowing the insect myself, I can tell you nothing about it of my own knowledge; but from your description of the larva, I should judge it to belong to the Order Diptera and the great *Musca* family, and to be allied to the genus *Ortalis*. I should be obliged by a few dozen specimens, packed, if possible, in a small tin box along with a little of their natural food. The tighter the box, the better.

Practical Pomologist, Penna.—*Question* 1st. "In case fires were lighted in the orchard in April or May, or torches were burned over tubs of water in the evening, what moths or insects would be likely to be destroyed?" *Answer*. There are not many insects that appear so early as April. In May, or later in the year, the particular species would vary according to the month and the locality. I cannot say what particular species would occur in Pennsylvania. On moonlight nights, and in a less degree on bright clear nights, but very few insects indeed would be attracted to the light. On dark cloudy nights, and especially if there is a small drizzle of warm rain or an immediate prospect of rain, with warm and what is popularly called "muggy" weather, there would be a great number attracted, and many would perish in the flames. The kinds that would be attracted and many of them destroyed would be: 1st the multitudinous species of moths, big and little, which are all of them injurious in the larva state, except a few which feed on noxious weeds, such as *Acronycta oblineata*, which usually feeds in large numbers upon smartweed, though I have bred a single specimen to the moth state which was found feeding on willow. 2nd. Boring-beetles, most of which come out in June and July. 3rd. Shad-flies (*Perla* family) and Caddis-flies (*Phryganea* family), the larvæ of which breed in water and are harmless. 4th. Gnats and midges, (Nemocerous Diptera), none of which are cannibals or parasites and some of which are injurious. 5th. Small leaf-hoppers, (*Tettigonia* family), belonging to the Order Homoptera, which Order alone is entirely composed of plant-feeding insects, many of them very injurious. 6th. Plate-horn beetles (*Scarabœus* family), none of which prey upon insects, and many of which, as the May-bug and the Rose-bug, are highly injurious. 7th. Ground-beetles (*Carabus* family), almost all of which are cannibals, and so far as they prey upon noxious insects, highly beneficial. *Harpalus pensylvanicus* and *Agonoderus pallipes*—two very common and abundant species belonging to this family—are particularly fond of flying into the fire in the night time. *Question* 2nd. "Would the proportion destroyed, of insects injurious to fruit-trees, be larger than that of friendly or beneficial insects?" *Answer*. It would decidedly—probably in the proportion of 100 to 1. There are but very few parasitic insects indeed, that ever fly by night, so far as my observation extends. Blister-beetles also, which are all of them injurious, fly in the day time.

Jas. H. Parsons, N. Y.—The black worms about 1¼ inch long, with four yellow stripes and the head and legs brick-red, which you found eating holes in Cabbage and Ruta Baga leaves, are the larvæ of *Mamestra picta*, (Harris). It has been called the "Zebra caterpillar" on account of the zebra-like fine cross-bars connecting the two lateral yellow stripes. You will find an excellent figure of it in Harris's Injurious Insects, p. 451. It ordinarily goes under ground in October, and appears as a light-brown moth in the following June. You observe that it stood a frost in September hard enough to freeze potatoes in the hill, the thermometer being at 18°—20°, without any apparent injury. There are many other insects that will do this. The pupa of the great *Cecropia* moth hangs on the trees all winter, enclosed in its pod-like cocoon of brown silk, and yet scarcely ever fails to change into the mature moth the following summer.

I do not clearly understand whether the "green-worms" you speak of as having infested your currant bushes for three years, were the larvæ of the *Imported* Sawfly (which is green with many black dots), or those of the *Native* Sawfly (which is entirely green). Please let me know, as it is important to ascertain the geographical distribution of these two insects. (See the Answer to Isaac Hicks in this number of the P. E.) Your cabbage larvæ arrived in excellent order, thanks to the tight little tin box in which you packed them; and I was glad to get them, as they do not occur in this neighborhood. The House-cricket you speak of as abundant in New York when you were a boy, round the large old-fashioned fire-places, must, from your description, have been the genuine American House-cricket, hitherto not found to the north of Maryland and Southern Illinois.

J. Pettit, C. W.—The *Agrilus* is *A. plumbeus* Lec. The Chrysomelian is *Cerotoma caminea* Fabr., very common in the States. Of the beetles found in funguses, the brown one 2-10ths inch long, with four yellow spots on the wing-cases, is *Eustrophus bifasciatus* Say, not very common; the one ¼ inch long, with black head, red thorax and dark blue wing-cases, is *Tetratoma truncorum* Lec., new to my collection, and quoted by LeConte as occurring in Canada as well as in the States; and the minute one with a pair of horns on the thorax of the male is a *Ceracis*, and differs from a species found abundantly in Illinois chiefly in the horns of the male being much slenderer. Dr. LeConte, in his recent Catalogue of N. A. Coleoptera, observes that *Cis thoracicornis* (Ziegler) belongs to the genus *Ennearthron*, but that the description does not enable it to be identified. He remarks further, that he has not studied critically the species of this family, and that his list is simply a compilation. He has not named my *Ceracis* and probably would not name yours.

The pretty little moth bred from golden-rod galls is probably *Euryptychia saligneana* (Clemens), respecting which see the PRACTICAL ENTOMOLOGIST I, No 3, p. 11 and note; the round golden-rod galls are probably, as you suppose, those of *Trypeta solidaginis* Fitch, and are quite common in Illinois.

The bugs which you found under the bark of an old log are undoubtedly, as you suppose, the true Chinch-bug of the States, (*Micropus* [*lygæus*] *leucopterus* Say). But they differ remarkably from our specimens by the wings being only half as long as the abdomen, instead of fully as long. All the eleven specimens that you send are precisely alike in this respect, and they are all perfect insects and not pupæ. Hence I infer that your short-winged form is a geographical variety of ours. Many cases have been noted by Westwood, where different species of insects, and especially of bugs, in one and the same locality and year, sometimes occur with quite short wings, sometimes with quite long ones, without any intermediate gradations between the two forms; and I have noted more than a dozen such cases in this country. The occurrence of the Chinch Bug in Canada is a new fact, and economically a very interesting and important one. As the insect, however, is more peculiarly a southern species, I do not apprehend that it is likely ever to swarm with you, as it often does in the West; and at all events, having such short wings, it will not be able in Canada to fly in swarms from one locality to another, as our little pest occasionally does.

J. B. Ellis, N. J.—The ear of corn with the worm in it which had burrowed under the husk among the kernels, destroying a great many of them, has reached me; but the worm itself was killed by the pressure of Uncle Sam's mail-matter, though not materially injured as a specimen. You would have done better to enclose it in a small tight tin box, with a few grains of corn by way of provision on the road, as I suggested before. (PRACTICAL ENTOMOLOGIST II, p. 9.)

So far as I can tell, without breeding the moth from it, it seems to be the same insect that almost entirely ruined the corn crop in Kansas in 1860; and of which very fair figures in all its states will be found in the *Prairie Farmer* of Jan. 31, 1861. The earlier specimens are said to leave the ear, go underground to pass into the pupa, and emerge thence in the winged moth-form the same season, in time to lay eggs for the second brood of worms, which, being of course greatly more numerous than the first, is the one that does the principal mischief. The last brood goes underground in the same way and stays there all the winter, ready to propagate the breed next summer. The Scientific name of the insect is not given in the *Prairie Farmer*, but it evidently belongs to the *Noctua* family, (Owlet moths,) and the Order Lepidoptera. I extract the following description of the larva, which, being based upon numerous specimens, is more reliable than any I could draw up from a single specimen.

"The worms, when fully grown, are about an inch in length, [the figures give them as 1½ inch long, and that is the length of your specimen,] and vary much in color and markings—some being brown, others green, striped with brown, and of all the intermediate shades. The body is sparingly clothed with short hairs, which rise from numerous black spots or warts, on each segment; and on each side is a yellow or lighter-colored longitudinal stripe. The younger caterpillars are of a reddish color, and similarly striped, and marked with numerous black spots."

The only remedy suggested is to destroy the first crop of worms, so as to put a stop to the propagation of the second brood. The damage done by this insect is not confined to the mere loss of the kernels which it devours, but it is said that "the ends of the ears, when partially devoured and left by this worm, afford a secure retreat for hundreds of small insects, which finish the work of destruction." From your account, the insect seems to have been very numerous with you; for you say that "almost every ear in the field shows a hole through the husk, from which, as you suppose, the varmint has come forth." Yes, you supposed right; these were the holes bored by the larva to make its escape into the earth. I notice that you say that "some of these worms are of a green color and others nearly black." This agrees with the description of them quoted above. It is stated that horses fed upon "wormy" corn in Kansas died very generally of "blind staggers;" hence you had better be careful how you feed it to your horses.

C. P. Wickersham, Penna.—The larvæ walking about in a moveable cocoon-like case, which you found on the Norway Fir the first week in August, and which in the beginning of October changed to a brown moth about ½ inch long, with transparent glassy wings and feathered antennæ, are the true *Thyridopteryx ephemeræformis* of Haworth. I referred them myself doubtingly to this species, but for greater certainty forwarded a specimen to Dr. B. Clemens, our best N. A. authority on the Lepidoptera. He kindly informs me that I had named the insect correctly, but that long after Howarth's time it was named by Dr. Packard as *Œceticus coniferarum*, the name of *Thyridopteryx ephemeræformis* being erroneously applied by that writer to a very different species; and further that, after Dr. Packard's paper was published, Mr. Grote gave a third name to this same species—*Hymenopsyche thoracicum* [*-ica ?*]. Thus we have three different names for the same insect, but according to the law of priority the first must take precedence of the two subsequent ones.

The species wrongly named *Thyridopteryx ephemeræformis* by Dr. Packard, is distinguishable at once from your insect by the wings not being glassy-transparent. Your insect is said by Mr. Cresson "to be very abundant on the shade-trees in the streets of Philadelphia, being commonly called the bag-worm, and to have been peculiarly destructive to the *arbor-vitæ* in 1866, stripping it completely of its foliage." I have not met with it out West, and was glad to receive your specimens, though not in as good order as is desirable.

It were much to be wished that some of our younger entomologists would be a little more careful in establishing new species, new genera, and even new families upon very insufficient foundations. At the rate at which they are now progressing, we shall soon have as many species as varieties, as many genera as species, and in the end as many families as genera.

C. H. Cushing, Kansas.—I do not believe that any of your "grasshopper" eggs will hatch out this fall. Respecting your other questions, see my Article on Grasshoppers and Locusts, in the PRACTICAL ENTOMOLOGIST, Vol. II, No. 1.

S. A. N., Mass.—The symmetrical masses of cocoons found on pear-trees, which you send, are those of some Ichneumon-fly—probably a *Microgaster*. They appear identical with those sent me last spring by Mr. Cook of your State, respecting which see PRACTICAL ENTOMOLOGIST I, p. 78. Mr. Cook's specimens were accidentally attached to the mass of eggs laid by the Moth of the common "Caterpillar" of the Apple-tree, (*Clisiocampa americana.*)

NOTE.

The following should have been appended as a foot-note to PRACTICAL ENTOMOLOGIST, Vol. II, No. 1, p. 2, column 1, line 18, after the word "species," but was accidentally omitted:—

I have a single unusually long-winged ♂ of *Caloptenus femur-rubrum*, in which the front wings are proportioned to the body exactly as in a rather short-winged ♂ *spretus*, namely, as .83 to .80; but I have met with no such case in the other sex. From the greater proportional length of wing, *spretus* seems at first sight to be a larger insect than *femur-rubrum*; but on measuring the length of the bodies of 6 ♀ *spretus* and 7 ♀ *femur-rubrum*, the average of the former was .97 inch and that of the latter .98 inch, the extremes of each being respectively .91—1.08 inch and .92—1.05 inch. Although all the intermediate grades occur, yet on an average of a great number of specimens, *femur-rubrum* has nearly a joint and a half more to its antennæ than *spretus*. In *spretus* 9 ♂ antennæ averaged 23.66 joints, and 8 ♀ antennæ 23.87 joints, the extremes of each being respectively 23—24 and 23—25 joints. In *femur-rubrum* 11 ♂ antennæ averaged 24.82 joints, and 11 ♀ antennæ 25.54 joints, the extremes of each being respectively 23—27 and 24—27 joints. Consequently in *spretus* 17 ♂ ♀ antennæ averaged 23.76 joints, and in *femur-rubrum* 22 ♂ ♀ antennæ averaged 25.18 joints; the differences between the two ♂ ♀ averages being 1.42 joints, or nearly a joint and a half, as stated above. A single ♂ *femur-rubrum*, with one antenna 22-jointed and the other 19-jointed, had evidently had them mutilated in the larval or pupal states, and was consequently not included in the above calculation. It is proper to add, that in both species there is some difficulty in counting the antennal joints with even-handed precision, homologous pairs of joints near the base of the flagellum and at its extreme tip being in different specimens sometimes perfectly free, sometimes connate, and sometimes so completely confluent as to form one long joint without the least trace of any suture; but in every specimen of either species that I have examined, the second joint of the flagellum is perfectly free and much shorter than any of the others. Hence closet-naturalists, who examined only a few specimens of each species, might easily be led to suppose, that the proportions of the antennal joints differed in each; which does not appear to be the case, the proportions being in reality variable in either species within certain limits. B. D. W.

☞ THE POSTAGE ☜

on the PRACTICAL ENTOMOLOGIST is 12 cents per year, or 3 cents per quarter, payable *in advance*, at the Post Office of the Subscriber.

☞ **INDEX TO VOLUME 1.**—At the time No. 12, of Vol. 1 of the PRACTICAL ENTOMOLOGIST was printed, it had not been decided whether to close the Volume with that number, or to continue it to the end of the second year; under those circumstances *our Index and Title* were not issued. But having since concluded to commence a new volume with the second years' issue, an Index and Title page to Volume 1 have been printed, and will be furnished to those wishing a copy.

ERRATA in Vol. II, No. 1

Page 9, column 1, line 1, for "chrysalises" read "four chrysalises."

Page 9, column 1, line 12, for "1—5 inch" read "1—5th inch."

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THE

Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

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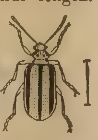
PHILADELPHIA, DECEMBER, 1866.

THE OLD-FASHIONED POTATO BUGS.

As the New or Colorado Potato Bug has been repeatedly confounded throughout the country with the different Potato Bugs, that have for time immemorial infested the Potato throughout the United States, I propose in this article to give a short account, illustrated by figures, of these last. The farmer can then see at a glance what kind of an enemy he has got to fight; and every soldier knows, that to be well acquainted with the *physique* and *morale* of your enemy is a battle half gained.

The annexed figure represents the THREE-LINED LEAF-BEETLE (*Lema trilineata*) considerably magnified, the hair-line showing its natural length. One character by which this insect may be easily distinguished from the common Cucumber-beetle (*Diabrotica vittata*),* which it otherwise strongly resembles at first sight, is the remarkable pinching in of the sides of the thorax, so as to make quite a lady-like waist there, or what naturalists call a "constriction." It is also, on the average, a somewhat larger insect, and differs in other less obvious respects.



Colors, cream-color & black.

The larva of this insect may be distinguished from all other larvæ, that feed on potato leaves, by its habit of covering itself with its own dung; in which respect it agrees with the Tortoise-beetles (*Cassida*)—for example, the Gold-bug (*Cassida pallida*) which feeds on the Morning Glory and also on the Sweet Potato, and the two-striped Tortoise-beetle (*C. bivittata*) which likewise feeds on the Sweet Potato in southern latitudes. There is another very common larva which has the same eccentric habits, and which may be found in great numbers on the Sumac (Rhus glabra) in Illinois, and probably in other States also south of New England. This last changes to an oval jumping Leaf-beetle, (*Blepharida rhois*,) about ¼ inch long and of a yellow color speckled with brick-red, so as strongly to resemble a variety of field-bean commonly grown among corn in the Western States.

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*Figured in the PRACTICAL ENTOMOLOGIST, I, p. 110. fig. 2.

There are two broods of this insect every year. The first brood of larvæ may be found on the Potato vines towards the latter end of June, and the second brood in August. They always retire under ground to assume the pupa state, the first brood staying there about a fortnight before they emerge in the perfect beetle state, and the second brood staying there all winter, and only emerging at the beginning of the following June. They then of course, as usual, pair and lay their eggs on the leaves of the potato, which eggs are said to be oblong-oval, of a golden yellow color, and to be glued to the leaves in parcels of six or eight together. The same process is repeated when the second brood of beetles emerges from the ground. Throughout the Eastern States, as may be readily seen from various answers to correspondents in the PRACTICAL ENTOMOLOGIST, this insect is quite common, and sometimes rather troublesome; but nowhere has it ever devastated the potato-vines, as ruinously as the Colorado beetle does, wherever it is once fairly established. Miss Plucke, however, of New York, says that "it destroyed her potato-vines for two years back, and threatened to do the same in 1866." (PRACTICAL ENTOMOLOGIST I, p. 113.) Throughout the Western States, so far as my experience goes, it is quite a rare insect, though at one point in Ohio it appears to be somewhat commoner, according to Mr. Benner. (See PRACTICAL ENTOMOLOGIST I, p. 114.)

The above insect, as will have been noticed, agrees with the Colorado Potato Bug in the larva, as well as the perfect insect, feeding on the leaves of the plant which it inhabits, and also in there being more than one brood of them every year. The three following differ from both the above insects in these two respects; for in these three it is only the perfect beetle that eats the leaves, the larva feeding underground upon roots of different kinds; and moreover there is but one brood of them every year. All three of these are true Blister-beetles, belonging to the same genus as the common Spanish Fly of the shops, and will raise just as good a blister as that does. Hence, wherever they occur in excessive numbers, they might be made to pay for the damage that they do by killing them in hot water, spreading them out to dry for a week or so, and then selling them to the apothecaries, with whom they would command now from $1.85 to $1.90 a pound. In this case, however, care should be taken not to inhale the fumes arising from their bodies, which fumes are of a very strong and almost poisonous nature.

The STRIPED BLISTER-BEETLE (*Lytta vittata*), of which a slightly magnified figure is annexed, occurs more abundantly in southern latitudes, but is occasionally seen in North Illinois and in New England. In South Illinois I found it quite abundant in a Potato field, but not so as to completely strip the leaves and even to devour all the smaller stems, as the Colorado beetle usually does, if not interfered with. In some specimens, the broad outer black stripe on the wing-cases is divided lengthways by a slender yellow line, so that instead of *two* there are *three* black stripes on each wing-case; and in the same field all the intermediate grades between the two varieties may be met with, thus proving that the four-striped individuals are not distinct species, as was supposed by Fabricius, but only varieties.

Colors--yellow and black.

The ASH-GRAY BLISTER-BEETLE (*Lytta cinerea*) is the common species met with in the Northern States, and scarcely differs at first sight from the above, except in being rather smaller and of a uniform ash-gray color. It attacks not only potato-vines, but also honey-locusts, and especially the English or Windsor bean. This bean I tried in vain for several successive years to raise in my garden, but was regularly foiled and beaten out by the ash-gray gentlemen, though I kept a girl at work picking them off the vines, till her fingers were completely sore and blistered up with crushing them. In one particular year, in conjunction with about equal numbers of the common rose-bug, (*Macrodactylus subspinosus*,) they invaded my apple-trees in great swarms, not only eating the foliage but gnawing into the young apples. But I have never known them do this before or since.

The BLACK BLISTER-BEETLE (*Lytta atrata*) is about the same size and shape as the above, but appears later in the season, (late in August instead of late in June), and is by no means so generally noxious. Harris reports having found it himself on potato-vines; and I have heard of it in Iowa from a correspondent, as very abundant on that plant; and Mr. Hill found it in 1866 "in countless numbers" on the potato in the State of Ohio, in company with the Striped Blister-beetle; (see P. E. I, p. 107;) but about the only plant on which I have myself noticed it is the Golden-rod (Solidago), on the flowers of which it appears in considerable numbers regularly every September.

The MARGINED BLISTER-BEETLE (*Lytta marginata*) only differs from the Black species in the wing-cases having an elegant, narrow, ash-gray edging all around Mr. Barber, of Wisconsin, found this species on his potato-vines, but not in very large numbers; (See PRACTICAL ENTOMOLOGIST I, p. 113;) but it more usually feeds on certain wild plants.

Almost the only known remedy for all the above insects, when they occur in injurious numbers on potatoes, is hand-picking or brushing them off the vines into shallow pans. As I have already once suggested, a pan with a lid to it like that of a common spittoon, would, I think, be found very convenient for this purpose· as the insects might then be shaken through the central hole into the hollow space below, whence it would be very difficult or almost impossible for them to make their way up again. According to Mr. M. S. Hill of Ohio, the farmers in that State got rid of the Blister-beetle in their potato fields in 1866, by burning small quantities of straw between the rows. (See PRACTICAL ENTOMOLOGIST, Vol. I, p. 107.) As the newspapers often say, "this requires confirmation," before we finally accept it as an available remedy.

B. D. W.

KLIPPART'S WHEAT PLANT.

This is a book of 700 pages, on a subject of great practical importance, published in 1860, at Cincinnati, Ohio. Its author has, for many years, filled the responsible position of Corresponding Secretary of the Ohio State Board of Agriculture, is a member of several Learned Societies in the West, and is popularly believed, in the Valley of the Mississippi, to be one of the most distinguished men of science in that region.

On the merits of the great bulk of the book, I shall say nothing, because having read but a small part of it, I know nothing whatever about the remainder. But as to the Chapter on "Animal parasites affecting the wheat," which occupies 45 pages printed in much smaller type than the rest of the work, (pp. 592—638,) I am enabled to pronounce a very decided opinion, because I have read that much of the book very carefully. If, after hearing the evidence, the reader, in common with myself, should be inclined to pronounce an unfavorable verdict upon the merits of this Chapter, Mr. Klippart has no one to blame but himself. I fully acquit him of intentional misrepresentation. His sins are those of careless hastiness and gross ignorance, not of wilful misstatement or intentional suppression of the truth. But surely this is not a sufficient excuse for a writer. If a thing is worth doing at all, it is worth doing well. Before a man undertakes to teach arithmetic, he should at least know the multiplication table. Before he professes to lecture on geometry, he should find out the difference between a circle and a square. And in the same way, before a writer publishes a treatise on noxious insects, he is bound in scientific honor to make himself acquainted with at least the rudimentary elements of the science of Entomology.

If we accept Mr. Klippart at his own valuation, he claims to be an entomologist of very distinguished attainments. One of the most difficult problems in entomology is, to decide to what perfect insect a particular larva belongs, when the perfect insect has never yet been actually bred from that larva. Yet on p. 593 he says of such a larva, with all the self-sufficient authority of a master of the science, "We consider it to be the offspring of *Agriotes sputator* and *Agriotes lineatus*." How the same larva happens to be produced by two entirely distinct beetles, he does not explain. Not to weary the reader with cases of this kind, in a note to page 603 he disputes, on the most frivolous grounds, the opinion of Dr. Fitch, in a matter where, as we might naturally expect, Dr. Fitch is in the right, and the Ohio gentleman is in the wrong. Indeed, I have no hesitation in saying, that the little finger of Dr. Fitch would cut up into a hundred such so-called entomologists as this Mr. Klippart, and as in the miracle of the loaves and fishes, leave full as much stuff behind, to be gathered up in baskets at the end of the operation, as was found to be present at the outset.

"But," it will be said, "these are mere unmeaning generalities." Very well, then. Let us, at the risk of being tedious, look carefully into the hard dry facts of the case.

Mr. Klippart professes to give a history of the various Noxious Insects that infest the Wheat-plant in this country, and of the different parasitic and cannibal insects that prey upon them. I have carefully catalogued the species named by him as coming under these categories, and they are 54 in number; and of most of these he gives brief descriptions and figures. Will it be believed now, that, out of this total of 54 professedly American insects, there are only 12 that are really found in America, the remaining 42 being exclusively European? Yet such is the fact. Nay, further. Out of the 12 insects really found in America, there are only 3 that are exclusively American, the other 9 species being imported insects, which have been introduced into America from Europe or the reverse, and the history of which he has copied almost verbatim from European Authors.

When I was a school-boy, my school-master, being a very severe disciplinarian, was in the habit of frequently inflicting punishment upon a very large number of us at once. Out of a class of perhaps 25 boys he would often punish, at one fell swoop, 22 or 23. To save time and trouble, therefore, he used to enumerate only those few that escaped castigation, and say nothing at all of those whom he intended to receive it. For example, he would say "All the boys except Brown and Smith will learn by heart the first Chapter of Matthew, and recite it without missing a word tomorrow morning." Upon the same principle, and in order to save printing a tedious list of names which would soon exhaust the reader's patience, instead of cataloguing the 42 European insects that Mr. Klippart wrongly assumes to be found in the United States, I shall content myself with enumerating only the 12 which he correctly states to be found there; and thus the 12 innocent ones being named, it will be easy to see who are the 42 guilty culprits. The 12 veritable U. S. species are the following:—1st., *Aphis granaria*, the Grain Plantlouse, usually now called *Aphis avenæ*. 2nd., *Cecidomyia* (*diplosis*) *tritici*, the Wheat midge. 3rd., *Cecidomyia destructor*, the Hessian Fly. 4th., *Calandra* (*sitophilus*) *oryzæ*, the Rice Weevil. 6th., *Trogosita mauritanica*, the Cadelle, common in granaries in Europe, and quoted in the Melsheimer Catalogue as occurring in this country also. 7th. *Tenebrio molitor*, the European Meal-worm beetle. 8th. *Tenebrio obscurus*, the N. A. Meal-worm beetle, introduced into England from the United States. 9th. *Tinea granella*, the Grain-moth. (The above are all found on both sides the Atlantic. The remaining three are exclusively confined to America.) 10th. *Glyphe* [*ceraphron*] *destructor*, one of the parasites of the Hessian Fly. 11th. *Micropus leucopterus*, the Chinch-bug. 12th. *Gortyna zeæ*, the Spindle-worm of Indian corn.

The real truth of the matter is, that Mr. Klippart wrote this long chapter of his upon the N. A. Insects of the Wheat-plant, not with his pen, but with his scissors. Jumping erroneously to the conclusion, that, whatever insects infested small grain in Europe, must necessarily also infest it in this country, he took several European treatises upon Noxious Insects, written by Curtis and others, clipped out a piece here and a piece there and another piece in a third place, and pasted the hodge-podge into a blank-book, which he is facetiously pleased to print as his own original work, for the edification of the farmers of the United States, with scarcely a word of acknowledgement to the distinguished authors whom he has thus plundered. But he has not even the merit of being an adept in his own miserable trade of scientific piracy. His materials are put together in so bungling a way, that the cloven-foot sticks out everywhere. For instance, in America by the word "corn" we always understand Indian corn or Maize; and wheat, rye, barley and oats are called "small grain" or simply "grain." In England these last are always called "corn," maize being scarcely grown there at all, except as a curiosity. Now, in no less than four distinct passages, (pp. 595, 598, 599 and 616,) Mr. Klippart, clipping with his scissors from European writers, forgot to change their European phrase "corn" into our American phrase "grain," and speaks of wheat, barley and oats as "corn"!! Again, although there are no birds in the United States popularly known as "lapwings," this great Ohio naturalist, copying from Authors writing in England, where such birds are very common, makes "lapwings" eat wire-worms in this country twice over, namely, on pages 599 and 630!! Thirdly, speaking of a strictly European Beetle (*Anisoplia horticola*), which he says is "very abundant in this country," (!!) he asserts that "it often covers the White-thorn hedges." Now "white-thorn hedges" are the commonest of all live fences in England, where the original author of the above remark resided; but there are probably not fifty such hedges in the whole United States, where the Great Ohio Clipper himself resides. Finally, instead of adopting some kind of system or classification in his compilations, as every author with any real claims to scientific distinction would be sure to do, items on one and the same subject are scattered about everywhere at haphazard, in this precious chapter; just as a newspaper editor, when he is hurried for time, clips items with his scissors from a hundred different exchanges, and slaps them into his paper anyhow and everyhow, higgledy-piggledy; hit or miss. For example, we find no less than eight different species of Click-beetles, (*Elater* family)—all of them, by the way, exclusively European species—named, described, and some of them figured as North American species.* Four of the eight are treated of on pages 592 and 593, three on pages 596 and 597, and the remaining one on page 622, the intervening pages being occupied with disquisitions on all kinds of other insects. As if this was not already sufficiently distressing, we find 17 lines of Mr. Klippart's clippings, on the subject of Click-beetles and their larvæ the Wire-worms, interpolated without rhyme or reason on pages 598—9, between his description of a Saw-fly (*Cephus pygmæus*), which infests wheat in Europe exclusively, and his speculations on the Wheat-midge, which has really been imported among us from Europe. So far, what we get upon this subject is simply stolen from European authors and marred in the stealing. But we have not yet done with the Click-beetles. On page 629, or seven pages later in the chapter, we are favored with two more figures of Click-beetles, which, however, Mr. Klippart cautiously abstains from naming, seeing that they are his own discovery in Ohio and not filched from his European friends. Let any good Entomologist look at these two figures, and he will say at once that they not only belong to two distinct species, but probably to two distinct genera. And yet, in the face of the notorious general rule that in this Family of Click-beetles the males and females are externally undistinguishable, this great Western Savant boldly pronounces that these two very distinct beetles are the sexes of one and the same species!! Again, the European Ichneumon-fly, *Pachymerus calcitrator* (misspelt twice over *Pachymesus calistrator!*) is treated of, both on page 598 and page 624. The imported Cadelle, *Trogosita mauritanica*, both on page 619 and page 628. The European parasitic fly, *Proctotrupes viator*, both on page 624 and page 631. The European parasitic fly, *Pteromalus micans*, both on page 618 and page 625. And, to crown the whole, not only is the European Ichneumon-fly, *Aphidius avenæ*, treated of both on page 595 and page 636, but the wood-cut representing it is repeated in both places!! If this is not mean business meanly done, I do not know what is. If a man must plagiarize, let him do it with some artistic skill. It degrades the miserable dignity of thiefdom, to steal in this clumsy, awkward, unprofessional manner.

If any man requires further proof that Mr. Klippart knows no more of entomology, than a newly-born baby does of the multiplication table, I will give one or two more instances of his scientific proficiency, and then retire from this disagreeable subject. On page 596 he speaks of the Plant-louse of the hop, (*Aphis humuli*,) as the *Hop-beetle* (*!!*), although he has his own figure staring him in the face to show that it is a true Plant-louse. Again, on page 595 he figures a female Grain Plant-louse, (*Aphis avenæ*,) which his own figure represents with a distinct ovipositor or egg-laying instrument, and names and describes it as a male, (!!) although no other author has yet succeeded in discovering the male of this particular species. Thirdly, after correctly naming the common Chinch-bug on page 619 as *Micropus leucopterus*, he gravely informs us on page 621, that it belongs to the genus *Rhyparochromus*, which it most certainly does not. At any rate it ought not, for the sake of consistency, to belong to two very distinct genera in three consecutive pages. Lastly—and this is the only original matter of any value in the whole chapter of 45 pages—on pages 636 and 637 he figures and describes some remarkable eggs found attached to an ear of wheat, in which eggs he discovered, as he says, the body of a parasitic Fly, and what he supposed to be the antennæ of a Wheat-midge; whence he arrives at the astounding conclusion, that the egg had contained "the larva of a Wheat-midge, partially transformed into a parasitic Fly." !! Whereas the very figure of the antenna which he himself gives, is as different from that of a Wheat-midge as a cow's horn is from a buck's horn, and is manifestly the true antenna of his parasitic fly; and Dr. Fitch subsequently proved that the eggs themselves had nothing whatever to do with the Wheat-midge, but were those of a common Cannibal Bug—*Nabis fera*—which preys upon Grain Plant-lice and doubtless on other insects also, and the eggs of which, as with so many other insects, are infested by a Parasitic Fly.[*] (*N. Y. Rep.* III, pp. 78, 112.)

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* *Agrypnus murinus*, *Agriotes lineatus*, *Agriotes obscurus*, *Agriotes sputator*, *Athous longicollis*, *Athous ruficaudis*, *Ath. niger*, and *Elater* (*lepidotus*) *holosericeus*. The only two species of the *Elater* family, that are known to occur on both sides of the Atlantic, so far as I am aware, are *Elater nigrinus* and *Corymbites confluens*, which, according to LeConte, are found both in Europe and *Russian* America.

But for the fact that this book about the Wheat-plant has had a very extensive circulation among Western Farmers, and has been commonly given as a prize at State Fairs by various State Agricultural Societies in the West, thereby to a certain extent endorsing it as scientifically and practically reliable; and but for the further fact that many young entomologists have, to my personal knowledge, been greatly puzzled and bewildered by its absurd misstatements, and that every plain farmer must, of course, be ten times worse puzzled, by having no less than forty-two European insects palmed off upon him, as natives of the United States, by this most mendacious work, I should not have thought it deserving of any notice in the PRACTICAL ENTOMOLOGIST. As it is, I expect that I have expended more time in refuting the book, than Mr. Klippart expended in compiling it. But the scissors can always beat the pen; and any child can utter more falsehoods in five minutes than a grown man can disprove in a whole day.

I am well aware that what I have said above will not be personally agreeable to Mr. Klippart and to Mr. Klippart's friends. But I long ago declared open war against all scientific charlatanism, and with me it is now "War to the knife and the knife to the hilt." It is about time that men, who know nothing whatever themselves about Entomology, should quit teaching Entomology to the million.

Something more I had to say of this sorry pretender to entomological knowledge; but let him go. I have already pilloried him on a bad eminence, from which he will not easily slink down again into his merited obscurity. So may it ever be with those, who defile the holy shrine of Science by offering impure gifts upon her altars! B. D. W.

Trimble's Insect Enemies of Fruit and Fruit-trees.

(*New York*, 1865.—*One thin quarto, pp.* 139.)

The author of this work, is Entomologist of the State Agricultural Society of New Jersey. The work itself treats exclusively of the two worst enemies of the Fruit-grower—the Curculio (*Conotrachelus nenuphar*), a Native American insect, and the Apple-worm Moth or Codling Moth (*Carpocapsa pomonella*), an imported insect. But, if encouraged as it ought to be, it is intended to be followed in succeeding volumes by similar treatises on other insects that infest Fruit and Fruit-trees.

With singular modesty Dr. Trimble speaks of himself as follows, (p. 88:)

> I am not an entomologist and never expect to be. If I knew all about the insects, I would be willing to accept the title. The fact is, I do not believe I know all about any one insect.

There is not an entomologist living, but, if he were honest, would make the same avowal. What little any one man knows in Entomology, or in any other department of Natural History, is but a drop in the bucket when compared with the vast illimitable unknown; and even the best of us—in the words of Sir Isaac Newton—are but as boys picking up a few shells on the shore of the great Ocean of Truth. But if Dr. Trimble is not a professed Entomologist in the ordinary sense of the term—i. e. a man who can give the scientific names of thousands of different insects, and troubles himself but little about their preparatory states, their mode of life, their food, their migrations, their loves and wars and sports, their habitations, and so forth—he is what practical fruit-growers will, I am sure, consider as something far more valuable. For he has devoted himself, heart and soul, for a long series of years, to studying the Natural History of the particular Insects which he has chosen for his subject, and the best and most efficient and most practical means of counterworking them.

Dr. Johnson used always to maintain, that the real Discoverer of a new Fact was, not the man that first hit upon it, but he who, having hit upon it, proclaimed it so long and so loudly to the world as to compel the world to listen to him. There is nothing absolutely original in Dr. Trimble's modes of fighting the Curculio and the Apple-worm, but, upon Dr. Johnson's principles, he is certainly entitled to the merit of having discovered these particular modes. For he not only shows at great length, by a long series of experiments, that these modes are practically reliable and infallible, but he exposes by incontrovertible facts the utter absurdity of a great number of quack nostrums, which have been recommended for the same purpose.

For full and complete details on this subject, every extensive Fruit-grower is earnestly advised to go to the work itself. In the meantime it may be briefly stated here, that in the case both of the Curculio and the Apple-moth, it is recommended to destroy as quickly as possible all the infested fruit that falls from the tree; that, in the case of the Curculio, jarring (not shaking) the infested tree upon white sheets, and killing all the "little Turks" that fall thereon, is the approved remedy, and in the case of the Apple-worm, wrapping hay-bands round the trunk of the infested tree, and destroying from time to time the insects contained in the cocoons formed on and in the bark beneath those hay-bands.

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[*] The accuracy of the author of the "Wheat Plant" may be judged of from the fact, that the highly-magnified tarsus of this Parasitic Fly is figured by him as *seven-jointed*; although no known insect has more than *five* joints to its "tarsus" or foot. (Page 636, fig. 8.)

On the subject of these same hay-bands, I cannot resist the temptation of quoting a short passage, illustrative of the vein of quaint, dry humor which crops out every now and then in the course of the work.

> But some people will say: "It will take a great deal of hay to go over a large orchard in this way, and hay is very dear now."—I have had a long fight with the insect enemies. There has been a good deal of wear and tear of patience. Job was a patient man—he bore all those boils with commendable resignation. Abraham Lincoln has been a patient man. To have borne all he has from the rebels on one side, and all their friends on the other, without once saying "by the Eternal," is a manifestation of gentleness almost superhuman. I am patient myself. A man who has fought the Curculio for so many years, must be patient. But when I meet a man who counts the cost of a yard of hay-rope, when he sees the ground covered with worthless fruit under each of those trees which he has worked at so long and so faithfully, and with no apples, no pears, and no fruit of any kind—why, then I lose my patience, and say—no, I won't say what I would say. (p. 127.)

There is but one drawback to this work. In one particular department the Artist has not done justice to the Author. Nothing can exceed the life-like beauty of Mr. Hochstein's plums and nectarines and apricots—they almost seem to melt in our mouths. In delineating the evil works of insects upon our choicest fruits, he is also great. But when he attempts to picture the insects themselves, he is nowhere. For example, the Apple-worm Moth (Plate IX, figs. 7 and 8) is quite unlike the genuine insect, both in coloring, and in the pattern drawn so deftly on its wings by nature. And as to the highly magnified colored drawings of the Curculio, (Plate VI, figs. 6 and 7,) they are like nothing in the heavens above, or in the earth beneath, or in the waters under the earth. B. D. W.

INSECTS IN THE ORCHARD.

BY DR. J. S. HOUGHTON, PHILADELPHIA.

My observations upon Insects have been chiefly directed towards the destruction of them. I have studied them, scientifically, only so far as to learn how to prevent their ravages in the orchard and garden. I have a few facts and suggestions which I should like to see discussed in the PRACTICAL ENTOMOLOGIST:—

1st. *The Curculio.*—It has been asserted by one of our leading fruit-growers, that the Curculio breeds in the Cherry. Is this so? We know very well that the Curculio stings the cherry, and probably deposits its eggs in that fruit; but does the cherry exist long enough to perfect the larvæ of the Curculio? If the cherry does breed the Curculio, the sooner we get rid of our Cherry-trees the better; for no other fruit can produce so many of these destructive insects.

2nd. *The Bark-louse on Pear-trees.*—My orchard has been severely afflicted with the Bark-louse, *Coccus*, or *Scale* insect. I am too thorough and careful in my cultivation, to give up to this enemy, but it has cost me much labor to keep these insects within reasonable bounds.

Last fall (1865), I had all the trees carefully painted with strong Soda wash. In the spring, and during the summer, not a living louse or scale could be found on thousands of trees. Even on the parts not painted, the Scale seemed to be all dead. Up to September 15th, I flattered myself that there was not a living insect of this description in my orchard, which covers a number of acres. I thought the winter of 1865—6 had been so cold it had killed them all. I had not before noticed any period in the year, when the Bark-louse, if on the trees, could not be found alive. But, lo! on the 20th of September, there were millions upon millions of bark-lice on my Pear-trees!

How and why was this? We had been at work upon and among the trees, all summer, and had constantly watched for bark-lice—four persons had thus watched. But there was no sign of a living insect, up to the 15th of September, and within five days afterwards, the trunks of thousands of Pear-trees were literally covered with "a multitude that no man could number."

The questions I would like to ask are as follows:

Does the female Coccus pass any portion of her life in or upon the soil?

Why does the Scale first appear upon the trunks of the trees, instead of the branches?

Is it probable, in the instance of the orchard above described, that the Coccus or Scale-eggs were deposited at the usual time, in June or July, and did not attract attention, until the insect had reached a certain size?

3rd. *The Cantharides.*—I have found, within a year or two, a great increase in ravenous Cantharis insects in my orchard. One large species, which I sent to Mr. Stauffer, of Lancaster, he thinks is not generally known to Entomologists. These Cantharides gnaw the young pears with great avidity, eating large holes in their sides, so as entirely to destroy the fruit. I have caught them in the act of eating the young pears. They are not easily alarmed, and may be readily caught, as they are quite large, and make no attempt to escape. I think they also eat the young fruit-buds, and the interior of the flowers. I shall watch them more closely next season. Should this insect increase very rapidly, it would totally destroy all hopes of a crop of fruit.

4th. *Destruction of Insects in the Soil.*—I have thought that the larvæ of many insects injurious to fruit-trees, might be destroyed in the soil, by very late plowing or digging, turning up the soil during cold, wet, frosty weather, and thus exposing the larvæ to conditions unfavorable to their existence. How much could be accomplished in this way?

Then the free application of salt, lime and ashes, in the fall, I have thought, might have much effect to destroy insect larvæ in the soil. Do you think so?

5th. *Evergreens as a Harbor for Insects.*—The question has lately presented itself to my mind, how far Evergreens, and especially Evergreen Hedges, in and about orchards, may prove injurious, by forming a safe harbor for insects in winter. I have several thousand evergreens in and near my orchard, and several thousand feet of very dense Norway Spruce and Arbor Vitæ hedges. These plants are, of course, infested with insects peculiar to themselves. They are subject to Aphides and Borers and Basket Worms. Do they also shelter the Curculio, the Codling Moth, and other insects destructive to fruit-trees? I should be glad to have some precise information on this point. Evergreens and hedges furnish protection to small birds, which often build their nests in them; but I fear the insects are more numerous than the birds.

6th. *Spiders and Wasps in the Orchard.*—These insects are very numerous in my orchard, and on the fruit-trees and evergreens. I have been told that the spiders attack the tender fruit-buds, and opening fruit-blossoms, and devour the pistils and the pollen. I have never seen anything of this. Is it probable? And what is the general influence of the spider in the orchard? Wasps and Bees are very injurious to ripening fruit. The Cantharides and the Click-beetles make holes in every fruit in the slightest degree decayed, and then the Wasps, Hornets and Bees finish the work of destruction. Do Spiders, Wasps, Bees or Hornets, destroy any other insects injurious to fruit-trees?

PHILADELPHIA, Oct. 1866.

ANSWERS TO THE ABOVE, BY B. D. W.

1st. I have no personal knowledge that the Curculio breeds in the cherry, but I see no reason to doubt the fact. Dr. Trimble, who is better authority on this subject than any other man in this country, because he has made Fruit Insects his special study for years, evidently believes that it does; for he recommends outlying cherry-trees, which cannot be properly attended to, to be cut down, to prevent the propagation of the Curculio. (See his *Fruit Insects*, pp. 26 and 39.) And Dr. Fitch has remarked upon the singular anomaly, that the cherry and the thorn-apple, which are small fruits, hang upon the tree and ripen when stung by the Curculio, "though so wounded, knotty and deformed, that the fruit is worthless;" while on the other hand, the plum, the apple, the pear and the peach, which are large fruits, wither under the same circumstances, and fall to the ground. (*Address on Curculio*, &c., 1860, p. 18.) It is undoubtedly true, that in very many apples and pears, the young larva of the Curculio perishes prematurely; but that is evidently because its natural food is stone-fruit, and it is only when she cannot do any better, that the mother-insect has recourse to pip-fruit. Indeed, it is only of late years, since the Curculio has become so greatly multiplied, that it has been observed to attack pip-fruit. Consequently, as the Cherry is so closely allied to the Plum, that many botanists class them under the same genus, and as the Plum is the favorite food of this insect, we might reasonably infer *a priori*, even if we had no reliable evidence on the subject, that the great bulk of the eggs deposited in the Cherry will come to maturity, unless artificially destroyed.

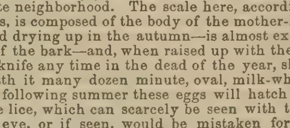
But, if we allow this to be so, I do not see the force of your reasoning, that we ought, on that account, to get rid of our Cherry-trees as soon as possible. It is a mistake to suppose that one plum can only feed one Curculio. I have repeatedly found several larvæ in the same plum, and Dr. Trimble has done the same. Hence, if one plum is equal in bulk of flesh to four cherries, a plum-tree with 500 plums is capable of producing as many Curculios as a cherry-tree with 2,000 cherries, supposing every fruit to be stocked with Curculio eggs to its utmost capacity; and your assumption that the Cherry can beat all other trees at raising Curculios is probably incorrect.

I may state here, that my belief is, that the Curculio passes the winter in the perfect state, hybernating, as I know many other snout-beetles to do, in moss, under dead bark, in tufts of old grass, &c., and that those which make their appearance in the spring to sting our early fruit, are the individuals bred in the fruit, and sometimes in the Black-knot, of the preceding year. Indeed Dr. Trimble has actually found specimens hybernating under the shingles of a roof, in the chinks of stone-walls, and under the bark of an apple-tree. (*Fruit Insects*, p. 99.) The duration of life among insects in the perfect state, has been very generally under-estimated by entomologists. (See some remarks on this subject in my Essay, *Trans. Ill. State Agr. Soc.* V, p. 475.) As to Dr. Fitch's notion, that there is a second brood of them, which is generated from eggs laid towards the end of the summer in certain slits in pear-twigs, I have little doubt that the egg-slits doubtingly referred to the Curculio by this author, were those of my *Chloroneura malefica* or some other small Homopterous insect. (See Fitch, *N. Y. Rep.* II, § 52, p. 33.) Dr. Trimble, upon dissecting several Curculios which he had bred the same season from fruit, found all their bodies to be empty of eggs; whereas, females captured in the spring contained many eggs, one of them in particular twenty-five in number. (*Fruit Insects*, pp. 43 and 73.)

2nd. What we call the "Bark-louse" or "Scale-insect" of the Apple-tree and Pear-tree, is nothing but a scale covering the eggs which are to hatch out next summer, and is not seen until the middle of the autumn, because previously to that time it had no existence, with the exception of the old ones of over a year's growth. There are two perfectly distinct Bark-lice which infest the Apple-tree, and I will now point out the distinctions between them.

The OYSTER-SHELL BARK-LOUSE, (*Aspidiotus conchiformis*), which is represented of its natural size on the annexed twig, a single individual being magnified to show its shape more clearly, is an imported Insect. It is an awful pest in the orchard—has been gradually spreading westward for many years—and has now reached my immediate neighborhood. The scale here, according to all authors, is composed of the body of the mother-louse dying and drying up in the autumn—is almost exactly the color of the bark—and, when raised up with the point of a pen-knife any time in the dead of the year, shows underneath it many dozen minute, oval, milk-white eggs. In the following summer these eggs will hatch out into minute lice, which can scarcely be seen with the unassisted eye, or if seen, would be mistaken for natural specks in the bark, as they hardly move at all.

HARRIS'S BARK-LOUSE, (*Coccus? Harrisii*, Walsh), which is exhibited in the annexed cut, in the same manner as the preceding, is a Native American Insect. I have noticed it for many years on Crab-trees, and in small numbers on apple-trees, but never, until 1866, found it to swarm on any Apple-tree so as to be dangerous, and then only in the case of a single tree in my own garden. The scale here is supposed by Harris to be constructed in



the autumn by the insect, like a cocoon, of some white material, its dried up and pale-brown body being attached to one end of it—is milk-white, so as to be in strong contrast with the bark—much more flattened than in the Oyster-shell species—and the eggs under the scale, instead of being milk-white, are pink or lake-red all through the winter. These eggs hatch out about as the preceding. The species was described, but not named, by Harris; and, just as he states, there are scales of two distinct shapes promiscuously intermixed, one short-oval* and the other very similar to that of the Oyster-shell species, as shown in the above figure at A and B. He is mistaken, however, in supposing that the oval scales are those of the male insect; for these, as well as the elongate or oyster-shaped ones, have a parcel of eggs under each of them; neither is it true, as he asserts, that the oval scales are only about half as long as the oyster-shaped ones; for on the average they are a trifle longer, though the range of variation is very considerable. Singularly enough, he says nothing of the remarkable red color of the eggs. As to the difference in the shape of the scales, as both kinds from their containing eggs under them must be those of females, I suppose we have here another case of what is called "Dimorphism" by modern Naturalists, as with the two kinds of females found among the Plant-lice. In any case the paragraph in Harris, (pp. 255—6,) which has been copied from Dalman's account of a Swedish kind of Bark-louse found on the aspen, (*Coccus cryptogamus*,) can have no application whatever to this species.

I doubt very much Harris's theory—which appears to be founded merely upon the analogy, now shown to be altogether erroneous, with Dalman's Swedish species of Bark-louse—that the scales of this American species are not composed of the dried body of the female, but "in the same way as the down which exudes from the bodies of other bark-lice." In the middle of November there may often be seen on such twigs as are infested by these scales, very numerous cast skins of the immature insects, not tightly affixed to the bark like the true egg-bearing scales, but loose like the cast skins of plant-lice. These cast skins are milk-white, oblong-oval, about 2½ or 3 times as long as wide, and show at one end of each precisely the same oval, pale-brown scale that appears at one end of the true egg-bearing scale of either shape. This pale-brown scale is divided, by faint cross-lines, into segments like the bodies of almost all insects. I infer that it is the cast skin of the back of the insect, and that the rest of the cast skin, which is white and devoid of cross-lines, is that of the inflated and elongated venter. What confirms me in this opinion is, that frequently the pale-brown scales may be met with without any white appendage behind them. Hence, I conclude, from analogy, that the true egg-bearing scale, also, whether the short-oval kind (A) or the oyster-shaped kind (B), is composed of the body of the female bark-louse, as in the imported species, and not, as Harris believed, spun or otherwise constructed by the insect. I have forwarded specimens of all these matters to the Entomological Society for the satisfaction of the incredulous. The whole case affords an instructive example of how the best of us are sometimes deceived by false analogies, and jump too hastily to erroneous conclusions. But after all, this is a matter of no practical importance, though it is of considerable scientific interest.

It only remains to add that when, as sometimes happens, these two kinds of Bark-lice are intermixed on the same tree, the oyster-shaped scales (B) of Harris's Bark-louse may be readily distinguished from those of the Imported species by their being milk-white, instead of the color of the bark, and by the eggs under them being pink instead of milk-white. We have here another instructive example of the difference between the destructive powers of Imported and Native American Insects. Myriads of trees in the United States have been killed by the Imported Bark-louse of the Apple-tree; and yet our Native Species, which infests the same apple-tree, has never yet been known to kill a single tree.

Soda-wash and other alkaline watery infusions, to be of any service, must be applied after the young bark-lice have hatched, or some time in June. The eggs are so effectually protected by the scale, that no watery infusion can reach them, though, as I have demonstrated by careful experiments, a thin coat of kerosene put on with a brush, any time in the dead of the year, will kill them every one. The reason is obvious. Nature has made the scales rain-tight, but, as we have no showers of oil, she has not thought it necessary to make them oil-tight. Probably benzine, as it evaporates much more quickly, would be preferable to kerosene, or perhaps either might bear to be diluted with water. I observed that about one-sixth of the limbs that I painted with pure kerosene died, and that in every case these were such limbs as were most badly infested by the Bark-louse. Possibly these would have died in any event, or, as I rather infer, being greatly weakened by the insect they might have had the finishing stroke given them by the kerosene.

I do not believe that either Soda-wash or Kerosene oil will kill egg or larva, except such as it actually touches. People are perpetually reasoning upon the assumption, that such substances are immediately taken into the circulation of the washed or oiled plant; as if plants, like the higher animals, had a complete circulatory system of veins and arteries, whereas every Botanist knows that it is no such thing. Hence, if Bark-lice had the habit of spreading themselves evenly over a whole tree, after the manner of the winged Plant-lice, it would be very difficult to fight them; for in that case we should have to apply the necessary wash or oil to every limb and twig. Fortunately, however, for us the female bark-louse is wingless, and the only way in which she can, as a general rule, pass from one tree to another, is by adhering to the feet of some bird as it flies from one tree to another. I have long observed that when a tree first begins to be attacked by bark-lice, it is only particular limbs and branches that are at first infected, and that these will be swarming while the rest of the tree will be free from lice. And I have further observed that it is the lower horizontal limbs and branches, or such as birds would most naturally perch on, that are first attacked. If neglected, however, the insect will gradually spread over the whole tree in the course of a few years, when, in the case of the Imported Bark-louse, the result is sure and speedy death. Hence, it will be seen that, to check the operations of the Bark-louse in its earlier stages, it is not necessary to operate on the whole tree, but only on such limbs as are actually infested.

I have found that Bark-lice may be greatly checked, by placing upon the infested tree, a dozen or two of the Ladybirds figured in the margin. The one to the left—the Twice-stabbed Ladybird (*Chilocorus bivulnerus*) may be taken on forest-trees in considerable numbers by beating the boughs into an inverted umbrella. The one to the right—the spotted Ladybird (*Hippodamia maculata*)—may be taken abundantly on herbage with a common "sweeping-net," which is simply a bag of strong cloth sewn upon a hoop of strong iron wire and attached to a stout staff.

Colors—black and red.

Colors, pink and black.

As to your queries under this head, I assume that your painting your trees with soda-wash did no good whatever, because it was done, as you yourself say, in the fall, when the insect was in the egg-state, and sheltered under the protecting scale. You saw no living insects the following summer, because they are then very minute, almost motionless, and hard to perceive with the naked eye. But when the new scale was formed on Sept. 20th, then you saw them. Most certainly the female Bark-louse never descends to the earth. On my own trees I never find any Bark-lice on the trunks, but then the trunks of my trees are scaly and rough, and yours having been treated with soda-wash would probably be smooth. I doubt the fact of the Scale appearing on your trunks any considerable time before it appeared on the branches. Your supposition that the eggs of Apple-tree Bark-lice could be deposited "in June or July" is of course incorrect, as has been shown above.

3rd. The large Blister-beetle, that eats your pears, is in all probability the *Lytta Sayi* of LeConte. Say first described it, supposing it to be a mere variety of his *Lytta ænea*, whereas it is in reality a distinct species. After LeConte had established it as a distinct species, and named it after Say, "*Sayi*," Fitch, supposing he had got hold of an undescribed species, named and described it over again as "*pyrivora*, or the Pear blistering-fly," stating that "it eats the young pears voraciously in June, and in a short time destroys all or nearly all upon the tree." (*N. Y. Rep.* II, § 58). Last of all, after the insect had been described by three preceding authors, and named by two of them, comes Mr. Stauffer, and supposes that "it is not generally known to Entomologists." I have myself taken it on wild flowers near Rock Island, Ill., but it is very rare there. The species is dark metallic-green, with red legs and black knees and tarsi, and is the size and shape of the Striped Blister-beetle, figured on page 26 of this number.

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* Harris says, "of a very *long* oval shape or almost four-sided;" but "long" is evidently a clerical error for "short." (See *Inj. Ins.* p. 255.)

4th. All root-feeding insects may be starved out and destroyed by perpetually plowing the land, so as to suffer no plant whatever to grow therein. But in an Orchard you cannot do this, because the roots of the trees must not be destroyed, and consequently there will always be food there for root-feeders. I do not believe that plowing or digging would at all bother underground larvæ, except by subjecting them for a short time to be preyed on by crows, robins, &c. Shortly after being exposed to the light of day, they will just "gather themselves up," as we say in the West, and burrow underground again. But with such Beetles, Moths and Flies, as are already in the pupa state and consequently inactive, it would no doubt have a beneficial tendency, because it would be apt to place them in unnatural conditions, too high or too low in the earth, too airy or not airy enough, too wet or too dry, &c., and thereby eventually cause their death. I have no faith whatever in the application to the soil of salt, lime, ashes, &c. in order to destroy insects. A dose heavy enough to kill insects will kill plants at the same time; and smaller doses will kill neither.

5th. I do not believe that evergreen hedges are likely to shelter such insects as peculiarly afflict the Orchard. Evergreens have, as you justly remark, their own peculiar insects, but these are none of them such as likewise make war upon fruit-trees. For example, the "Basket-worms" that you speak of, which I suppose are the larvæ of *Thyridopteryx ephemeræformis*, otherwise known as "bag-worms," (See Answer to C. P. Wickersham, Pa., in PRACTICAL ENTOMOLOGIST II, p. 22) never have been known, I believe, to attack any of the trees grown in our orchards for fruit.

6th. All known spiders are cannibals, chiefly feeding upon insects, though they are by no means particular as to the good or bad character of the species they prey on, whether it be a plant-feeder, or a cannibal like themselves, or a parasite. Sometimes they mete out retributive justice in rather an amusing way. The common black and yellow Mud-wasp, (*Pelopœus lunatus*), as is well known, provisions its nest with a small greenish-yellow spider, which spins no web, but haunts flowers, and lives by catching such insects as visit those flowers for the sake of their honey and pollen. Last summer I saw a large web-spinning spider envelop one of these Mud-wasps in his net in an out-building of mine, after a long and severe contest; and the next day I found the Mud-wasp dead and sucked as dry as a bone. Thus the ravenous spider-killer succumbed to a spider. The so-called "Red Spider" that infests greenhouses (*Erythrœus telarius*) is not a true Spider, but a mite. On the whole, the influence of Spiders upon the insect-world is generally beneficial to us, and they ought by no manner of means to be disturbed in their operations.

Your statement that "Click-beetles" [*Elater* family] as well as Blister-beetles make holes in fruit is quite a new fact. Are you sure that you have not mistaken some other insect for a "Click-beetle?" Please send me specimens next summer, that I may identify the species. None of the Bees destroy other insects, except a few Cuckoo-bees, which, like our Cow-bird and the European Cuckoo, lay their eggs in the nests of other Bees, the larvæ proceeding from which eggs starve out or, as I believe, destroy the rightful tenant and appropriate the food laid up for him. As to Wasps, there are hosts of them, and it requires very considerable knowledge of Entomology to distinguish one kind from another, each kind having its peculiar habits. As a general rule most Wasps catch insects for their young, each species affecting a certain group of insects as its prey; but they themselves feed upon honey, pollen, &c. The Social Wasps (Hornets and Yellow-jackets) are more exclusively vegetable-feeders in the larva state, but by no means entirely so. Some of the Cuckoo-bees referred to before, (genus *Nomada*), resemble wasps very much, and would be taken for wasps by anybody but a professed entomologist. As a general rule, the influence of wasps is beneficial to man, and they should not be disturbed, except when they trouble ripe fruit. In England, under such circumstances, they are commonly caught in large numbers by hanging up narrow-mouthed phials, half full of sweetened water or sweetened beer, on the infested fruit-trees.

ANSWERS TO CORRESPONDENTS.

M. S. Hill, Ohio.—The two Cicada (popularly called "Locusts,") that you send, are the two sexes of the common 17-year Cicada, (*Cicada septendecim.*) You observe that they are "scarcely half the size of the common 17-year Locust and much darker underneath, that their song is entirely different, and that they are much less abundant." You must have mistaken some of the larger species of *Cicada* for the true 17-year species. One of these, which I believe is undescribed, has the same yellow wing-veins as the 17-year species, but is distinguishable by being proportionally much stouter, by the thorax being conspicuously marked with yellow, and by the size being almost twice as great. If this large species swarmed with you in 1866, it is a new fact. I have but a single specimen in my cabinet, and should be obliged if you could furnish me with more.

You say that "in 1864 all the gooseberry bushes in your vicinity were entirely stripped of their leaves by a small green worm, about ½ inch in length. In 1865 it again made its appearance, but not in such great numbers, while in 1866 you have not seen a single worm." You further remark that "you cannot state positively whether they were marked with rows of black spots or not." The spots on the larva of the *Imported* Gooseberry Sawfly (*Nematus ventricosus*) are so conspicuous, that you could scarcely fail to observe them; and besides, if it had been this species that troubled you, it would not have gradually disappeared in 1865 and 1866. Hence I infer that your species was my *Pristiphora grossulariæ*, or the *Native* Gooseberry Sawfly, which as you will see from the answer to Isaac Hicks of New York. (PRACTICAL ENTOMOLOGIST II, p. 20) seems to have appeared in other States besides Ohio, from time to time. It is perpetually the case that after a new Insect has been once described and brought into general notice, it turns out to be quite common in a variety of different localities.

Miss Marion Hobart, Ill.—The small roughish tubercles so thickly set on a piece of dry twig, are probably caused by the puncture of some insect; but they do not now contain, and have not previously contained any eggs. The bald-faced hornet, (*Vespa maculata*), which suspends its large paper nest to the boughs of trees, like all other species of that genus, including the common "Yellow-jackets," of which in Illinois we have several species, breaks up housekeeping when the weather begins to turn cold in the autumn. The workers then all perish, as well as the drones or males; but the large females retire under very rotten logs half buried in the ground, in which situation I have repeatedly found them early in the following spring, and pass the winter there in a torpid state. As soon as the spring opens, each female hornet comes forth into the open air again and becomes the founder of a new colony. It was formerly supposed that the workers in this genus were barren and laid no eggs, or at all events nothing but eggs that produced male wasps. But according to the distinguished English Hymenopterist, Mr. Fred. Smith, it has been demonstrated by Dr. Ormerod, Mr. Stone and others, that worker wasps can and do lay eggs that produce other worker wasps. The proof of this very remarkable fact is simple. A nest containing a single female and several workers is in early spring deprived of the female; and it is found that the building of fresh cells and the production of fresh workers therein, goes on as successfully as if the mother-female had remained in the nest. (Stainton's *Entomological Annual*, 1861, p. 39.) Whether these worker wasps are capable of generating, in the autumn, females of the usual large size, to continue the breed for another year, does not appear to have been as yet ascertained. The whole subject is a very curious one, and is recommended to the attention of entomological observers, as it involves many very curious physiological questions. The experience of many years, confirmed by the observations of the best European entomologists, has satisfied me that in the genus *Vespa* the males make their appearance only towards the autumn, say the last of August and early in September. In the allied genus *Polistes*, of which we have two species in North Illinois and a great many in South Illinois, and which makes a nest composed of a mass of hexagonal cells like the Hornet, but does not cover these cells over with a large paper envelop, I have often observed that the females pass the winter under the loose bark of standing trees, generally such as are dead.

M. C. D., N. Y.—The whitish worm about an inch long, found in flour, is probably the larva of the Meal-worm Beetle (*Tenebrio molitor*), a species which was imported long ago from Europe, and which commonly infests all kinds of bread-stuffs, bran, &c. There is also a Native American species (*Tenebrio obscurus*), which peculiarly infests flour, but is not near so common or so abundant or so destructive as the other. Both of them, in the perfect state, are oblong-oval black beetles, about ¾ inch long, the former a little polished, the latter of a very dead opaque black without the slightest gloss. There is no way to keep them out of flour, but to make the vessel or bin containing it perfectly beetle-tight; and if it is already full of their eggs and young larvæ, to destroy those eggs and young larvæ either by hot water or by fumigation with sulphur. The evil may be palliated by cleansing the bin thoroughly before filling it a second time, and keeping the lid always tightly closed.

There are a good many beetles which "bore holes about the size of pins in timber under the floors of buildings." Most of them belong to the *Anobium* family, and the larvæ of some of them make a *ticking* noise as they bore, commonly known as the "death-watch." A century and a half ago, Dean Swift ridiculed this superstition about a worm being possessed of prophetic powers by the well-known lines:

> "A kettle of scalding-hot water injected
> Infallibly cures the timber infected,
> The worm it will die but the man will recover."

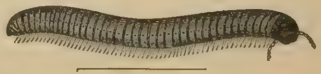
The species that chiefly infests pine timber in Illinois, is the *Ptinus brunneus* of Duftschmidt, a chestnut-brown species about ⅛ inch long, with antennæ as long as its body. But different kinds of timber are affected by different species. The time of the year at which the timber is cut has nothing to do with the presence of these minute borers. "Kyanized" timber—i. e. timber saturated with a solution of corrosive sublimate—they will not attack. The pin-holes seen in timber growing in the woods are mostly produced by other beetles belonging to the genus *Tomicus*, and the *Scolytus* family.

J. B. Ellis, N. J.—The scientific name of the Moth that produces your corn-worm is *Heliothis armigera*, and it is identical with the larva that burrows into the bolls of the Cotton in the South, and is known there as "the boll-worm." The chief difference seems to be, that in the Southern States there are three broods of larvæ every year, and in the Northern States only two. Mr. Glover gives the following, as proof of the identity of the cotton-feeding larva: "I have frequently taken the worms from unripe ears of corn and fed them entirely on cotton-bolls, as also the worms from cotton and fed them on corn, and in no case did the change of diet appear to affect the health of the caterpillars in the least, as they went through all their transformations in exactly the same manner, and when the perfect moths made their appearance they could not be distinguished from each other." (*Agr. Bureau, Monthly Rep.*, July, 1866, p. 284.)

Geo. W. Robinson, N. Y.—The worm you send, is not a true Insect, but belongs to the genus *Iulus* in the Class Myriapoda or thousand-legged worms. As with the wire-worms, which are the larvæ of certain Click-beetles (*Elater* family), the body is elongate-cylindrical, hard and horny, but it is readily distinguishable from these by having a very large number of legs strung all along its body, instead of only six legs placed at the front end of its body. The account you give of its operations is something quite new, no species of *Iulus* having been hitherto observed to attack living vegetable matter, though in Europe certain species of allied genera, (*Geophilus electricus* and *Polydesmus complanatus*), have been long known to bore into carrots, parsneps and potatoes, and thereby greatly injure them. So far as is recorded in such authors as are accessible to me, and so far as my own experience extends, all other species of *Iulus* live on decaying vegetable matters, such as rotten wood; and this is certainly the habit of the giant of the genus, *Iulus marginatus*, which I recently received from Ohio. (See PRACTICAL ENTOMOLOGIST II, p. 10. I print in full, your account of the habits of this creature, as they are not only interesting but important.

"This destructive worm has possession of the length and breadth of my garden, and of many others in the vicinity. In the day time it is out of sight, inhabiting the ground, but is often found on turning up a stone or a piece of board. During the night it travels about on the surface of the ground. Often in digging I have found a nest of them, from the patriarchs of a mahogany color, down to such as were no bigger than small pieces of white thread. The indictment against them is this: They feed on the fine fibrous roots of most plants, but are especially destructive to strawberries. These they slowly work at, gradually dwarfing them to mere weeds, blossoms and fruit having vanished forever. The same dwarfing is seen in many other plants, young trees and vines, which must be referred to the same agency. Their scattered position in the ground effectually shields them from any warfare that I am able to wage against them. The currant worm and all others that live above board I can overcome; but in respect to these pests I am only second best."

It is a general law in the Animal Kingdom that where the habits differ materially the structure differs also; and your worm forms no exception to the above law. In the true genus *Iulus*, as limited by Latreille, the antennæ are seven-jointed, the second joint long and the last joint small. In your worm the antennæ are six-jointed, the second joint long and the last joint small. Hence we may either regard it as forming by itself a distinct genus, or, which I rather prefer, a distinct Subgenus or section of the genus *Iulus*. In *Iulus marginatus* Say, (known to feed on decaying vegetable matter), the joints of the antennæ are proportioned as 1, 3, 2, 2, 2, 2, 1; in your worm (known to feed on living vegetable matter) as 1, 3, 2, 2, 2, 1. As your worm, so far as I can find out, belongs to a hitherto unnamed and undescribed species, I annex a name and description, as well as a figure, the hair-line showing the true length.



IULUS MULTISTRIATUS, n. sp. (*The many-grooved Iulus.*) Body brown. Face towards the mouth, mouth, the tips of all the joints of the body, and the venter and legs, all whitish. Head glabrous and polished. Eyes black, pear-shaped, the large end upwards, with about 5 granulations counting from one side of the pear to the other. First joint of the body glabrous and polished, and nearly as long as the three succeeding joints, which are shorter than the rest. All the joints, except the first and the two last, with a fine, acute, transverse, submarginal stria in front, from which proceed in a backward direction, nearly to the tip of the joint, about 40 or 50 fine, acute, longitudinal striæ, with their interstices flat. Penultimate and last joints with fine and shallow punctures. Last joint obtusely rounded at tip, paler than the rest, and broadly margined all round with whitish.

Length of the largest individual, 1.15 inch; diameter .08 inch. Described from 7 specimens. Comes near *Iulus lactarius* Say, but differs in having no dorsal rufous vitta nor subobsolete lateral one, in the joints of the body being longitudinally striate with flat interstices, not longitudinally carinate, and in the eye being pyriform, not triangular. Neither is the line of the stigmata geminate, as is said to be the case in *lactarius*. From *I. pusillus* Say, it is distinguished at once by the striæ being dorsal as well as lateral; and from *I. annulatus* Say, by the joints bearing each about 40 or 50 striæ, instead of about 15 carinæ. Say's other three species are quite different.

As to counterworking this worm, as it has been hitherto unknown, experience can of course teach us nothing, and we can only be successful by patiently experimenting. I should recommend you to begin by putting small pieces of potato, carrot or parsnep, or such other vegetable substances as you may from analogy infer to be agreeable to it, under pieces of board laid flat on the ground by way of traps; and then visiting the traps with a lantern at bed-time and the first thing after it is light in the morning. A great deal may also be effected by pertinaciously killing every individual that you come across, when you are spading and hoeing your ground. *Iulus*, so far as I am aware, is like almost all other articulate animals in laying eggs and not bringing forth its young alive.

Since the above was in type, I have ascertained that Dr. Fitch has found the very European centipede referred to above (*Polydesmus complanatus*) to destroy the roots of young cabbages, onions, &c., in New York, and that he has also noticed some species or other of *Iulus*—he does not specify which—intermixed among them. (*Ann. Reg. Rural Affairs*, 1861, pp. 96 and 100.)

Willie C. Fish, Mass.—The very minute gnat that you send, the larva of which inhabits a fold on the edge of one of the terminal leaves of the cranberry-plant, is, as you suppose a *Cecidomyia*, or gall-gnat. There are whole hosts of these gall-gnats inhabiting similar folds and other deformations on various plants, which, like your insect, are undescribed. As you say that there are not usually more than two of these galls to one shoot of the vine, and sometimes only one, I should scarcely have supposed that they could do material injury to the vine, judging from the analogy of similar galls on other plants. Yet you say, that the owner of a cranberry bog of seven acres, estimated the damage done by this insect in 1866, at several hundred dollars, and that "the mischief done is in killing the extreme tip of the vine, which prevents the formation of a fruit-bud for the next year's growth, unless the vine by an extra effort puts them out at the side, as is frequently the case." Of the five specimens sent by you, which you bred from these cranberry-galls, one was a minute *Chalcis* fly, which had of course preyed upon the larva of one of the gall-makers. Thus, as you may now see, you have a good friend at hand to check the unlimited increase of this insect. Your specimens were in very poor order, and next year I should be glad if you could send me a number of the galls containing the living larvæ and pupæ, packed in any little tin box, the tighter the better. Baron Osten Sacken describes another and very different gall made by a gall-gnat on Vaccinium (Cranberry) or Gaylussacia (?). This is in accordance with what I believe to be a general law, namely, that where one species of a given genus of gall-makers infests a given genus of plants, many more species of the same genus may almost invariably be found thereupon.

The two flies sent are *Eristalis cuprovittata*, (Weid.), a very common species. The green carrion-beetle is a *Saprinus*, and identical with two specimens received by me from Colorado, which I have not been able to name, and which may probably be undescribed, though there are already 55 described species belonging to this genus. What you take for an ant is a female *Mutilla*—the females in which genus are always wingless, but may be distinguished from ants at once by their antennæ not being flail-shaped, It is undoubtedly the *M. montivaga*, so accurately and fully described by Mr. Cresson in the *Proceedings*, and like that writer I have received it myself from Colorado. I presume that you yourself received both these last two insects from the Rocky Mountain region, though you say nothing to that effect.

Answers to Miss Marion Hobart, Thomas T. Smith and Geo. Scarborough, will be given in our next number

Another Humbug.

The following Advertisement has been extensively inserted in the Agricultural Press, and we republish it in our columns without charging Mr. Sheldon anything:—

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So far so good. But "the proof of the pudding is in the eating," and here is what Mr. J. D. Wisner, of West Dresden, N. Y., says about this "Patent Composition," in the *Cultivator and Country Gentleman*, of November 22, 1866:—

> "P. B. Sheldon's Patent Composition for Fruit-trees has been tested in this vicinity, this season, on hundreds of trees. The result has been worse than a failure, as it has killed quite a number of thrifty trees, and others as good as dead. It was removed in a few weeks after it was applied, or it would have been far worse for the rest. Wherever it washes down the tree, the bark dies and cracks open to the wood. There are also borers in the trees now."

This is really the unkindest cut of all. It not only, as it appears, does not kill the borers, but it kills the trees!! Poor Mr. Sheldon!!

NOTICES.

The **American Agriculturist**, published monthly in New York, at only $1,50 a year, is one of the largest, the cheapest and the best of the very valuable class of periodicals to which it belongs. There are single illustrations in single numbers, which, as works of art, are almost worth the subscription money for a whole year. We would instance the Wood engraving of a Merino Ram in the number for November, 1866, drawn by Edwin Forbes of New York, and that of Highland Cattle, designed by the French Artist, Rosa Bonheur, which appeared a month or two ago. What can be more charming, again, and more life-like and natural, than the Guinea-pig, in the November number, poking his curious nose among a happy family, composed of a Pussy-cat and her five kittens? We can almost hear the intruder sniff audibly, as he pauses with uplifted head to ascertain what kind of a reception he is likely to meet with. In scientific matters, it is only necessary to point to the admirable series of Botanical articles contributed by Dr. Asa Gray. But what preeminently distinguishes this paper, is the honest and fearless war which it has long waged against the thousand and one Swindling Humbugs, for cheating the Farmer out of his money. The genus "Humbug" is a most extensive one, and the number of species comprised in it is quite numerous. Yet multitudinous as is this great army, and powerful as it is in the sinews of war, the *Agriculturist* has not hesitated to attack it. We must confess that we are astonished at such unparalleled boldness. We have occasionally ventured ourselves to skirmish a little with one single species—classified by the best authors as *Humbuggus entomologicus*; but this fighting hand to hand against such fearful odds, is more than we should have ever dared to attempt.

The **Country Gentleman** is issued weekly, at Albany, New York, forming yearly two quarto volumes of 400 pages each, at the low price of $2,50 a year, if paid in advance. It is very fully illustrated, and has been long adopted by Dr. Fitch, the State Entomologist of N. Y., as a medium for the publication of some of his very reliable and able Papers on Economic Entomology.

The **Prairie Farmer** is printed and published at Chicago, Ill., in the same form as the preceding, at $2 per annum, and is one of the ablest and best and most widely circulated papers of its class. Its chief entomological contributor is Mr. C. V. Riley, of Chicago, a promising young entomologist, who has already made several valuable additions to our knowledge of the habits of Noxious Insects. Dr. Fitch long ago characterized the *Prairie Farmer* as "that excellent periodical, which has contributed so much to render the agriculturists of the West enlightened and intelligent in their vocation." (*N. Y. Rep.* I, p. 282.)

Colman's Rural World is published bi-monthly, at St. Louis, Mo., in the same form as the two preceding, making one yearly volume of about 400 pages, at $2 per annum. As we might anticipate, from the place of its publication, it circulates more especially in Southern latitudes, and often contains valuable papers on the management of what are peculiarly Southern crops. In the list of special contributors for 1866, we notice, among others, the names of Dr. Hull, the distinguished pomologist, of Alton, Ill., and of Mr. Carew Sanders, the well-known scientific Horticulturist.

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Salem, Mass., Dec. 8, 1866.

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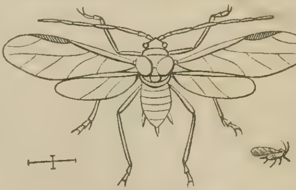
PHILADELPHIA, JANUARY, 1867.

Plant-lice—their Friends and their Enemies.

Every one must have noticed, that in the summer time the tips of the young shoots of apple-trees often become covered with very fine blackish powder, the leaves on them curl up and assume an unhealthy blackish appearance, and on examination both the twigs themselves and the under surface of the leaves are found to be swarming with myriads of minute greenish lice, some of them winged, but most of them without any wings. These are Plant-lice, belonging to the genus *Aphis* and the *Aphis* family of the Order Homoptera. The annexed cut shows one of the winged individuals, highly magnified; and the wingless ones do not materially differ, except in having no wings. The hair-line to the left of the figure shows the natural size of the insect, which is called the Apple-tree Plant-louse, (*Aphis mali*,) and is found in every State, from Maine to Kentucky and from Pennsylvania to Kansas. The lower figure shows one of the wingless individuals, similarly magnified, and that to the right a winged specimen, but slightly magnified, and with its wings closed over its back.



Colors—Green and Black.

Every one must also have noticed, that in the summer time the leaves of currant -bushes are frequently covered with irregular bulges or blister-like elevations on their upper surface, with corresponding hollows on their lower surface. These hollows, on a closer inspection, will be seen to be full of lice, some winged and some wingless, and only differing from the Apple-tree Plant-lice in certain details of color, &c. The insect itself is called the Currant Plant-louse (*Aphis ribis*,) and, like the preceding, has in all probability been imported into this country from Europe.

If we examine a cabbage-plant towards the autumn, we shall sometimes see all the outer leaves covered by similar lice, except that they are dusted over with a white powder, and differ from either of the preceding in certain peculiarities of color, &c. But never, under any circumstances, shall we see the cabbage leaves curl up or bulge into blister-like projections under the punctures of these insects, as was found to be the case with the Plant-lice of the Apple and the Currant. The cause of this difference can only be attributed to certain unknown peculiarities of the plant which we call a cabbage. It cannot be owing exclusively to the greater thickness of the leaf of the cabbage, as compared with the leaves of the apple or the currant, because there are numerous plants with quite thin leaves which are infested by Plant-lice, but which do not in consequence thereof have their leaves curl up or bulge out. The Cabbage Plant-louse is scientifically known as *Aphis brassicæ*, and has likewise been introduced among us from Europe.

In the same way many other plants—for example, the Plum, the Cherry, the Peach, the Grape-vine, the Rose, the Willow, the Maize or Indian corn, and the group of cereal plants known as Wheat, Rye, Oats and Barley—are infested each by a peculiar species of *Aphis*, and sometimes by several distinct species; and, as a general rule, a species that inhabits one plant cannot live upon another, but perishes if transferred to it by artificial means. In the case of Wheat, Rye, Oats and Barley, however, the same insect can live indifferently upon either, as in the year 1861 the Farmers of New York and New England and Pennsylvania ascertained to their cost; the Grain Plant-louse (*Aphis avenæ*) having in that year multiplied so prodigiously in that section of country, as greatly to damage the grain crop, and more especially the later-maturing grain, such as Spring Wheat and Oats.

Besides the genus *Aphis*, there are other genera of Plant-lice belonging to the same *Aphis* family, but differing in the veining of their wings and in other minute particulars, and differing also more or less in their habits. For example, the Woolly-Plant-louse of the Apple-tree, (*Eriosoma lanigera*), belongs to the genus *Eriosoma*, which has only *one* instead of *two* branches springing from the third vein in its front wing, (see the above figure,) and inhabits the limbs and trunk of the infested tree rather than the leaves and small twigs. Again, the root Plant-louse of the Apple-tree, (*Pemphigus pyri*,) belongs to the genus *Pemphigus*, which has the third vein in its front wing perfectly simple, and not at all forked or sprangled, and inhabits the roots of the infested tree exclusively. Trifling and unimportant as such distinctions may appear to the general reader, they are yet almost perfectly constant and invariable. Take a hundred winged Plant-lice from the leaves of an Apple-tree, and every one of them will have the third vein of the front wing twice forked. Take a hundred winged Woolly-Plantlice from the limbs of the same tree, and every one of them will have the third vein once forked. Take a hundred winged Root-Plantlice from the roots of the same tree, and every one of them will have the third vein devoid of any forks at all. Where nature is the workwoman, there are seldom any botches.

Besides the genera of Plant-lice referred to above, there are others which originate and inhabit curious excrescences or "galls" upon different plants. But in what I am now about to say, I shall, for the sake of brevity, confine myself exclusively to the Plant-lice belonging to the genus *Aphis*, none of which inhabit galls, and but a single North American species of which—the Maize Plant-louse (*Aphis maidis*)—ever lives underground upon the roots of the infested plant; and even that one occasionally emerges into the light of day, and attacks the stems of the roasting-ears.

People are often puzzled at finding an Apple-tree or other plant swarming with Plant-lice, when, a week or ten days before, there was scarcely one to be seen on it. The reason is the prodigious fecundity and the very early maturity of these insects. As a general rule, an *Aphis* in the summer season attains complete maturity in ten or twelve days, after which time it produces every day about two young ones, which, contrary to the general rule with insects, are born alive and not in the egg-state. Hence, the English Entomologist, Mr. Curtis, has calculated that from a single female, in seven generations, 720 millions of lice may be produced. But in the case of the Grain Plant-louse, the possible rate of increase is more astonishing still; for Dr. Fitch ascertained, by actual experiment, that one of the wingless females of this species becomes a mother at three days old, and thereafter produces four little babies every day; so that even in the short space of twenty days her descendants, if not destroyed from extraneous sources, would number upwards of two millions. If the human species increased at the same prodigious rate, how rapidly the land-speculators would make their fortunes!

The arithmetical reader may perhaps object, that in the above calculations no allowance has been made for a certain per centage being males, and consequently barren. But—strange to say—all through the summer there are no males at all born, all that are born, whether you choose to call them females or not, being fertile individuals and giving birth to others, and these to others still, and so on indefinitely, without any intercourse with the opposite sex. How, under these circumstances, the process of generation is accomplished, is a curious and at present an unsettled problem. Some distinguished German entomologists maintain that these so-called females are neuters (Ammen), without any regular ovaries developed, and that it is by a budding process, analogous to that of the Polyps, that the young plant-lice are developed within the body of the parent stock. I have just heard from Mr. Darwin that it has been demonstrated by Balbiani, in a paper recently published, that these individuals at first are neither females, nor neuters, but hermaphrodites. If this be so, it is the only known instance of an animal, so high in the scale of the creation as an insect, being of the hermaphrodite sex; though several inferior Mollusks, our common Snails for example, are so. As a general rule, most species of *Aphis* produce males late in the season, when copulation takes place in the usual manner, and eggs are laid by the impregnated females to continue the species next year. In the case of the Apple-tree Plant-louse the eggs, which are minute, shining, elongate-oval, black bodies, may be found in the winter in large numbers glued to the twigs. But in the case of the Grain Plant-louse Dr. Fitch says, that "he has watched it the year round, so closely, that he is perfectly assured no eggs were laid and no males were produced;" and he further states that in the autumn "the mature lice continued to produce young ones, until they and their young became congealed upon the leaves of the young grain by the advancing cold of the season. And in this state they were buried beneath the snows of winter, and with the warmth of the ensuing spring they were thawed and returned to life again." (*Prairie Farmer*, Nov. 8, 1862, p. 292.) Mr. Cyrus Thomas also found living lice upon young green fall-wheat, in South Illinois, in the middle of the winter, and after much sleet and snow had fallen. (*Prairie Farmer*, Jan. 18, 1862, p. 35.) Nay, even so far north as Connecticut, Mr Verrill found very numerous Woolly Plant-lice of all sizes on the branches of an Apple-tree so late in the year as December 11, and after "two snowstorms and many cold rains and freezing nights." (PRACTICAL ENTOMOLOGIST I, p. 21.) Except on the hypothesis that in certain species of Plant-lice males do not appear at all, or only appear in certain exceptional seasons, it seems difficult to explain all the above facts. Similar cases occur in certain other families of Insects, for instance the Gall-flies.

After all, such calculations as those which have been quoted above, of the astonishing fecundity of Plant-lice, are rather matters of theoretical curiosity than of practical utility. In point of fact, Plant-lice never do increase at anything approaching to the rate established by the theory, because they are always more or less checked and controlled by certain causes to be hereafter explained. Thus the theory is like one of those problems in Mechanics, where it is assumed that a lever is perfectly inflexible, that a rope is perfectly flexible, and that there is no such thing as friction, none of which three things can ever take place in actual practice; or like the problem with which the schoolmen in the middle ages amused themselves, namely, how many thousand angels could dance on the point of a needle without jostling one another?

FRIENDS OF THE PLANT-LICE.

If the reader will refer once more to the figure given above, he will find—besides the little projection at the extreme tip of the abdomen, which is the ovipositor or egg-laying instrument—another little horn-like projection on each side of the abdomen not very far from its tip. This is called the honey-tube, and through it the insect has the power of secreting at will a drop of sugary fluid. If the plant-lice are left to themselves, this fluid is from time to time discharged upon the leaves of the infested plant, when after drying up it forms a sweet glutinous substance, well known to school-boys by the name of honey-dew. Thanks to the poor despised "bug-hunters," we now fully understand the nature and origin of this "honey-dew." But in olden times it puzzled philosophers dreadfully, because in those times it was considered to be beneath the dignity of a philosopher, to open his eyes and read for himself in the Great Book of Nature. For instance, the Roman naturalist, Pliny, gravely hesitates whether to call this honey-dew "the sweat of the heavens, the saliva of the stars, or a liquid produced by the purgation of the air."

But in 99 cases out of a 100, the *Aphis* is not allowed "to waste her sweetness on the desert air." Ants, as most housewives know to their cost, are very fond of sweet things, and wherever you find a tree or other plant infested by *Aphis*, there you find almost invariably swarms of ants passing and repassing up and down the trunk of the tree or the stem of the plant. Examine closely one of the groups of Plant-lice, and you will generally see one or more ants walking about among them. Examine the group still more closely with the assistance of a pocket lens, and you will from time to time perceive an ant drumming gently on the back of a Plant-louse with its flail-shaped antennæ, till it has coaxed the Plant-louse into emitting from its honey-tubes a drop of sugary fluid. This the ant greedily absorbs, and then passes on to another and another, until having filled itself to repletion, it descends to the earth and regains its nest. Here the sweet fluid is disgorged into the mouths of the helpless and legless white maggots, which are the larvæ of the future ants, and which are entirely dependent for their food upon the fostering care of these working or wingless ants, the male ants, like the drone of the honey-bee, being idle gentlemen, and the female ants, like the queen-bee, seldom leaving the nest. In the words of Linnæus, which were uttered a century ago, though very few, except professed naturalists, have heeded them up to the present day, "The ant ascends the tree, that it may milk its cows the Plant-lice."

In Natural History there is scarcely a single rule without its exception. The facts recounted above will apply to hundreds of different species of *Aphis;* but in the case of the Grain Plant-louse (*Aphis avenæ*), though the honey-tubes are well developed, yet they emit no honey; and in consequence of this remarkable anomaly the species, as has been remarked by Dr. Fitch, is not attended by any ants. In other words, as this peculiar breed of cows gives no milk at all, the milk-maids do not think it worth while to visit them. In the human species, little boys and girls sometimes deceive one another into mistaking an empty egg-shell for an egg full of meat; and it is said that professed cock-fighters have been more than once deceived, by having a clipped and disguised eagle pitted against a genuine game-cock; but you cannot deceive an ant into mistaking a Grain Plant-louse for an individual of the ordinary honey-producing species. Call it instinct, or inherited experience, or acquired experience, or acute powers of sensation, or reason, or what you will, the fact is indisputable, that my friends, the poor despised insects, often know more than such an exalted and highly-educated being as Man. Of the thirty millions of men that inhabit the United States, probably not a thousand persons could distinguish a Grain Plant-louse from an Apple-tree Plant-louse, when the two were placed side by side. Of the billions upon billions of ants that inhabit the same country, probably not a single individual would be puzzled to tell the difference between the two. Take any philosopher in Christendom, blind-fold him, and set him down in a large and dense forest five miles away from his own house, and he will likely enough starve before he finds his way home without assistance. Put a common honey-bee in a close box, and carry it to the same forest five miles from its hive, and after it has gorged itself with honey it will fly so straight home, that its path has passed into a proverb and is known as a "bee-line." And yet the ant and the bee are commonly thought, by the high and the low vulgar, to be beneath the notice of any grown man!

I have dwelt the longer upon what might be poetically called "The loves of the Ants and the Plant-lice," because, although the whole thing has been perfectly well understood by Naturalists for the last century, yet unscientific persons are perpetually mistaking the effect for the cause, and making war upon the ants, which do them no harm whatever, instead of upon the Plant-lice, which are the real authors of the mischief, but which from their extreme minuteness are entirely overlooked, or perhaps supposed by some to be young and immature ants. They might just as well, because a herd of cows had broken into their garden and trampled down and eaten up their flowers, pursue the inoffensive milk-maids with fire and sword. You can scarcely take up an Agricultural Journal, without listening to the complaints of some indignant correspondent, that the ants have ruined his rose-bushes, or his apple-trees, or his verbenas, or his currant-bushes; that he has tried to dig them out, and tried to burn them out, and tried to scald them out; but that the more he digs and the more he burns and the more he scalds, the more they seem to increase and multiply. No wonder. He has been barking up the wrong tree. He has mistaken an inoffensive neutral for a bitter enemy. He has committed the common error of confounding the After with the Because—the *post quod* with the *propter quod*—and jumped to the conclusion that because the Ants swarm on the infested plants, therefore it must necessarily be the Ants that do all the mischief there.

It is certainly true that in houses certain species of Ants are sometimes very troublesome and very destructive, from their habit of searching out everything that is of a sugary nature, to carry off as food for their young larvæ. In nicely kept gardens also, they sometimes raise unsightly little mounds of earth, in the construction of their underground habitations. But otherwise they are entirely harmless, and may even be considered as beneficial, from their practice of carrying off to their nests dead or wounded or sick insects, as food for their young larvæ. Often have I watched an ant dragging along, through the tangled herbage, a wounded caterpillar four or five times as large as itself, and been struck with admiration at the persevering manner in which it would toil under the unwieldy burden, till some neighbor at last would come to its assistance. Living and vigorous and healthy insects I do not believe that they often attempt to prey upon; at least such is my experience with the Ants of this country, though certain exotic species are said to do so. But woe to the wounded! woe to the sick and helpless! woe to the crippled! Them the Black Ant, them the Red Ant, them the Yellow Ant, them the great host of Brown Ants instinctively mark as their prey. Them they seize by the wing, or the leg, or the head, or any other part that comes handiest, and haul them away forthwith to death and destruction. To fastidious persons perhaps, who have just wiped their own lips after swallowing a few dozen raw oysters in the agonies of death, this may seem cruel and ungenerous and ferocious behavior. But it is part and parcel of the great law of Nature—"Kill and be killed, eat and be eaten. Let the strong and healthy live. Let the sick and the weak and the wounded die and cease to cumber the earth." Only by the unshrinking enforcement of such stern laws as these, can Nature attain what appears to be her chief object in the works of the Creation—the greatest happiness of the greatest possible number of individuals.*

It has commonly been contended that, but for the careful attendance and watchful vigilance of the Ants, Plant-lice could not thrive and multiply at the prodigious rate at which they commonly do. But the case of the Grain Plant-louse seems to contradict this theory. No species of *Aphis* multiplies with more fearful rapidity, and yet it is entirely unattended by Ants, as we learn from Dr. Fitch.

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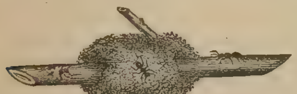
*According to Mr. Glover, the Southern Army Worm or Grass Caterpillar of the South (*Laphrygma macra*) was attacked in Georgia by certain ants, as often as it attempted to cross a broad and sandy carriage-road, passing through the middle of the grass field that it inhabited, in search of better food. (*Rep. Agr. Bureau*, Oct. 1866, p. 377.) But this is a very different thing from its being attacked by these ants while it remained in its proper situation—on the grass. The half-wild dogs in Constantinople have each of them their regular districts; and so long as they keep within their own districts, they are not molested by other dogs. But whenever one is driven by hunger to stray into a strange district, he is immediately torn to pieces by the dogs that belong to that district. So, in a kennel of hounds, if a hound is asleep on a bench and accidentally falls off, the other hounds will tear him to pieces. The general principal seems to be, that any unusual action, indicating distress, want or disease, authorizes capital punishment. Every farmer's wife knows that a sick hen or sick hog is often worried and killed by its companions; and Shakspeare has moralized on the fact, that a wounded deer it often gored to death by the rest of the herd.

It is certainly true that the Ants, if they can help it, will not allow any winged fly to visit their milch-kine, being probably afraid that such flies come to rob them of the sugary fluid in which they take such delight. Thus—unconscious of what they are really doing—they often drive off *Ichneumon* flies, that would otherwise deposit their eggs in the bodies of the Plant-lice and thereby cause their death, and *Syrphus* flies that would otherwise lay their eggs among the Plant-lice. But I have repeatedly seen them gathering in crowds round one of the fat, fleshy *Aphis*-devouring larvæ of the *Syrphus* flies, pulling him about in every direction, as if to ascertain whether he had got any honey in his body, like their friends the Plant-lice; and then, having apparently satisfied themselves that the fat gentleman was not in the grocery business, and not knowing that he butchered daily hundreds of their honey-producing friends, turn away in despair, and leave him unharmed and unwounded to his own devices, as a "hard case" that nobody could make anything out of. It is apparently for the same reason, namely, to prevent sugar-loving flies from robbing them of their own private and peculiar honey-dew, that ants occasionally construct a kind of tent round a little flock of their plant-lice, but only where those plant-lice are located on a twig, and never, so far as I have observed, where they are located on a leaf. Two such sets of cases I have personally observed, in one of which several scores of an undescribed *Aphis*, that inhabits the twigs of the Red Osier Dogwood (Cornus stolonifera), had been enclosed in a dark-brown tent, composed of minute particles of bark, by a common black species of *Myrmica*, (probably the *lineolata* of Say,) as represented in the annexed wood-cut, which is drawn from nature. In the other case another undescribed *Aphis*, which inhabits the twigs of two species of Willow, (Salix cordata and S. longifolia,) had been surrounded with a similar but very much larger tent, by an ant belonging to the genus *Formica*, but what particular species I have forgotten. A case of the same kind on a species of Alder is recorded by Mr. Wm. Couper, as occurring near Toronto, in Upper Canada. (*Proceedings*, &c. I, p. 373.)

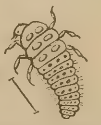


ENEMIES OF THE PLANT-LICE.

Unlike the Hare, which, according to the Fable, had "many friends," the Plant-louse has but one friend—the Ant; but its enemies are legion. Volumes might be written on this subject, but it must suffice here to indicate briefly the principal groups of insects which attack them, omitting such details as would be interesting only to the professed Naturalist. But for the enormous number of these enemies—enormous, not only in the number of particular species, but in the number of individuals belonging to each particular species—there can be no question that, on account of the prodigious rate at which Plant-lice "increase and multiply and replenish the earth," every green thing on the face of the globe would, in a very few months, be utterly destroyed by them.

The first and most prominent in the list, are various species of Ladybirds (*Coccinella* family), two of the commonest of which are represented in the annexed wood-cut, the hair-line showing the natural length of each. The one to the right is the 9-marked Ladybird (*Coccinella 9-notata*); that to the left is the Spotted Ladybird (*Hippodamia maculata*), which is one of the few insects found indiscriminately both in Europe and North America, but which there is no reason to think has been imported by man, from one country to the other. There are a great many other species, mostly yellowish or reddish with black spots, or black with yellowish or reddish spots. The larvæ of all of them have a strong general resemblance, being elongate, active, lizard-like insects, generally of a dusky color, with more or less yellowish spots, and with six legs placed at the fore part of their bodies. The middle figure in the above wood-cut exhibits one of these larvæ.

Colors, pink and black.



Colors, yellowish and blackish.

Colors, brick-red, black and white.

For the last three years, as I learn from an excellent article on Hop Culture, published in the *New York Tribune*, (Sept. 18, 1866,) the Hop-plants in the United States have been infested by a peculiar *Aphis*.* For time immemorial this plant has likewise been infested in Europe by an *Aphis;* and it is, therefore, not improbable that the insect may have been introduced thence into this country, along with imported hop-vines. Be this as it may, it is stated, that in the United States the *Aphis* sometimes "blights whole hop-yards and renders their product worthless," and that "the most efficient natural remedy against its ravages is the ladybug or ladybird." The larva of the Ladybird is said to be well-known to the hop-pickers, under the name of "black nigger" or "serpent," and to be carefully preserved by them "as one of their most efficient friends."

Another genus of Ladybirds (*Chilocorus*) is usually of a highly-polished black color with red spots, and in shape resembles almost exactly the half of a split pea. The right hand figure in the annexed wood-cut exhibits a very common species—the Twice-stabbed Ladybird (*Chilocorus bivulnerus*), the name referring to the two blood-colored spots or stab-like markings on the back. This species, however, preys more peculiarly upon bark-lice, and so occasionally does the Spotted Ladybird which has been figured above. The species to the left is the Northern Ladybird, (*Epilachna borealis*), and it is figured here because it is remarkable for being the only known North American species which feeds upon vegetable substances, being a bitter enemy to the squash-vine. (See PRACTICAL ENTOMOLOGIST I, p. 111.) The larva between the two figures, with some slight variation, might be taken for the larva of either of the above two species, having numerous sprangling prickles growing out of its back, which, however, may be handled with perfect impunity.

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* This agrees pretty well with a statement which I find in the *Rural New Yorker*, of Oct. 10, 1863, that plant-lice made their first appearance on the hop-vine, in Oneida and Madison Counties, N. Y., in the year 1863.

Colors, honey-yellow and black.

Colors, yellowish with blackish prickles.

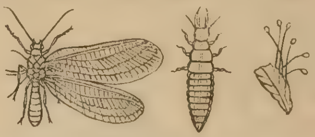
Colors, black and red.

There is still another genus of Ladybirds, (*Scymnus*,) which comprises insects that are much smaller and of obscure brown colors, in some species with the tail brick-red or yellowish. The larvæ of these have numerous white evenly-shorn filaments growing from their backs, and I recently received some from a Wisconsin Cranberry-grower, along with the Cranberry Plant-louse, he supposing that both insects were equally destructive to his vines. Whereas, instead of being an enemy, the *Scymnus* larva was experimentally proved by me to prey on the plant-lice, and to be in all probability the only efficient friend that he had toward keeping within bounds his plant-feeding foe. (See the PRACTICAL ENTOMOLOGIST, Vol. II, p. 8.)

Dr. Fitch tells an amusing story of a very similar mistake, which was made by one of his neighbors, whose rose-bushes were grievously infested by Plant-lice. He complained, we are informed, to the Doctor that, although he took the greatest pains to go over the infested bushes every morning, and destroy all the "old ones," yet that his bushes were ten times as badly injured by plant-lice, as those of his neighbors, who took no pains at all to war upon the enemy. On examination it turned out, that the worthy gentleman had occupied himself every morning, in killing off all the Ladybird larvæ that he could find, supposing that these were the mothers of the plant-lice, and that he should thus nip the evil in the bud. In other words he had fired into the ranks of his best friends, and allowed his enemies to march where they would, and increase and multiply at discretion.

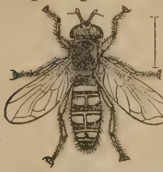
It is only necessary to add, that the eggs of most Ladybirds are small, yellow, elongate-oval bodies, and that they are usually attached endways, in clusters of a dozen or so, on the under side of the leaf of the infested plant. The pupa of these insects, as with all other Beetles, is stationary and eats nothing, being generally suspended by the tail to some plant. But in the genus *Chilocorus* the full-grown larva fixes itself firmly, at full length, to a branch, and the pupa state is assumed inside the prickly skin of the larva. The same thing takes place in certain other Ladybirds, but in their case the larval skin splits open along the back so as to show the pupa inside.

The next group of Insects which make war upon the Plant-lice is the Golden-eyed Flies, (*Chrysopa* genus, *Hemerobius* family, Order Neuroptera,) of which we have several dozen North American species, differing by very minute characters, but all of them slow-flying, green-bodied insects, with eyes of burnished gold, and transparent wings veined with grass-green. The left hand figure in the annexed cut shows one of these insects, the two left wings being omitted from the drawing to save space. They have the remarkable habit of attaching their eggs to the tip of long filaments spun by the body of the females, so that a bunch of these eggs strongly resembles certain mosses when they are gone to seed. The right hand figure exhibits a few of their eggs attached to a leaf, but I have sometimes noticed as many as twenty in one group. The larva of the Golden-eyed Flies (see the middle figure, which is magnified fully two diameters) is shaped a good deal like that of the Ladybirds, but is usually of a sober brownish color, and may be readily distinguished from the other one by its very elongate protruding jaws. Its habits are nearly the same as those of the Ladybird larvæ, and like them it is fond of preying on the eggs of various insects. But the pupa, instead of being suspended naked by the tail or enclosed in the skin of the larva, is protected by a tough globular or short-oval silken cocoon, with so smooth a surface that it might almost be mistaken for the seed of some plant. The cocoon, in all the species known to me, is remarkable for being unusually small in comparison with the large fly that comes out of it; so that, in Dr. Fitch's graphic language, "it seems like a full-grown hen hatching from an ordinary-sized egg."

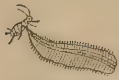


Authors, copying from one another, have attributed to all or almost all these Golden-eyed Flies the peculiarity of giving out a very offensive smell, when handled. I do not doubt that this may be so in the case of particular European species, for there is strong testimony to that effect. But it is certainly not generally true of our North American species. I have handled, myself, thousands of specimens belonging to dozens of different species, and could never yet perceive that they gave out any smell whatever, whether pleasant or unpleasant.

A third group of insects that prey most savagely upon the Plant-lice, but only while it is itself in the larva state, is composed of various species belonging to the *Syrphus* family in the Order Diptera. In the perfect state these are all of them two-winged flies, some of them of an obscure brown color, and some beautifully banded like a "yellowjacket" with black and yellow. The upper figure in the annexed cut shows one of these last—the *Syrphus politus* of Say—the hair-line exhibiting its natural length. The lower figure shows the larva of a species of *Syrphus* transfixing an *Aphis* with its pointed mouth, and sucking out its juices as it holds it helplessly suspended in the air. Unlike the two groups of larvæ, which we have just been considering, these *Syrphus* larvæ are slow-going, fleshy, footless, whitish maggots, and the egg from which they take their origin is always deposited by the parent-fly right in the midst of a colony of the Plant-lice, whereas the eggs of the others are sometimes laid a considerable distance off. The reason is obvious. The former are active six-legged insects, and having good eyes of their own can readily seek out their prey. The latter are sluggish legless fellows, and, strange to say, they are perfectly blind.



Colors, black and yellow.



Color, whitish.

Few things are more amusing than to watch the proceedings of one of these *Syrphus* larvæ among a lot of Plant-lice; which may be readily done even with the naked eye, though a pocket-lens is a great assistance. You see a leech-like maggot slowly crawling along, and swaying his pointed head first to one side and then to the other, as an elephant moves his trunk. The head comes within a hair's breadth of a plant-louse, and you fancy that the poor plant-louse is doomed. No such thing; the *Syrphus* has not actually touched his prey, and like a blind Cyclops he goes groping along till accidentally he touches one. Then, like a flash of lightning, he impales his victim, hoists him in the air, in spite of all his kickings and strugglings, and in a few seconds has sucked him as dry as a bone, exhibiting, under the lens, as much greedy gusto, as an Alderman would do in swallowing a plate of turtle-soup. Jerking away the empty skin, he then proceeds with grave and earnest solemnity, as if he were well aware that he is performing a sacred duty towards society, to search out another and another victim; till having satisfied both his appetite and his conscience, he reposes for awhile from his labors, with the pleasing conviction, that he has tickled his own palate, and at the very same time discharged his obligations towards that sublunary world, of which he forms so important a member.

It is almost impossible to find a group of plant-lice of any magnitude, without one or more of these *Syrphus* larvæ among them; and yet Farmers and Gardeners and Orchardists, with hundreds of such scenes as the above constantly under their very noses, go through life with their eyes shut and fail to see them. As the old proverb has it, "None are so blind as those that won't see." It may be added here, that most of the *Syrphus* flies are distinguishable, by the habit that they have of occasionally hovering motionless for a few seconds in the air, like our Sparrow-hawk. In both cases the object probably is to discover the more readily that prey, which a wise Providence has appointed them to attack; the Sparrow-hawk carrying off its quarry to its nest, and the *Syrphus* fly building no nest at all, but laying its egg where it instinctively knows that its future family will find abundance of food.

Besides the above three principal groups of enemies, Plant-lice, in common with most other groups of Insects, are attacked by *Ichneumon* flies, which inject a single egg into their bodies with their ovipositor. As in similar cases, this egg becomes a larva, and gradually devours the body of the living victim which it inhabits, finally emerging as a minute four-winged Fly, belonging to the sub-group *Aphidius* of the group *Bracon* of the great *Ichneumon* family. In a small parcel of Plant-lice sent me from Kentucky, I counted no less than two or three dozen of these minute *Ichneumon* flies, which had hatched out on the journey. (See PRACTICAL ENTOMOLOGIST, Vol. I, p. 100.) Plant-lice attacked in this manner, like other ichneumonized insects, affix themselves firmly to the surface on which they stand, and may be otherwise distinguished from such as are in good robust health, by their swollen and bloated bodies. If they are carefully opened, the maggot-like larva of the *Ichneumon* fly may often be found coiled up inside them.

Besides all the above, there are many other insects which occasionally or habitually prey upon plant-lice. I have noticed a "Devil's darning-needle" (*Agrion*) flying among my currant-bushes with one of the Currant-bush Plant-lice in its mouth. Certain wood-wasps also, (*Crabro* family,) provision their nests with the bodies of these insects, in Europe and probably in this country as well; for in the heart of one of the Pine-cone like galls, which are so common everywhere on the tips of the twigs of a Willow, (Salix cordata,) and which have been named *strobiloides* by Baron Osten Sacken, I once found a little heap of plant-lice, which had evidently been placed there as provision for the young larva of some kind of Wasp or other. A species of the true bugs (Heteroptera) known as *Nabis fera*—an elongate, long-legged, grayish-brown insect, about ½ inch long, belonging to the *Reduvius* family—is likewise said by Dr. Fitch to attack the Grain Plant-louse; but this Bug, as I have noticed, is confined to low-growing plants, and its place upon trees and shrubs seems to be supplied by other members of the same family, the *Reduvius raptatorius* of Say and the *R. multispinosus* of DeGeer. Finally, the all-devouring spiders, which are spread everywhere, and which all of them feed exclusively upon animal food, must, in all probability, occasionally make a meal off the plant-lice.

As a general rule, I do not believe that plant-lice are injurious to fruit-trees, because in limited numbers they operate as a summer-pruning, and tend to throw the tree to fruit; and their numerous enemies usually prevent them from increasing to any alarming extent for any great length of time.

When, however, they become unduly numerous, the best and most effectual remedy, and one which has been practised for many years back by European horticulturists, is to place upon the infested plants a number of their natural enemies, collected in the woods and fields. For this purpose the means for collecting insects, ordinarily employed by Entomologists, are readily available; but as I propose to elucidate this subject in a future paper, I will not enter upon it here. On greenhouse plants fumigation with tobacco is an effectual remedy, but it is too troublesome and expensive to be employed in the Garden or the Orchard. As to the various washes recommended for this purpose, I have not much faith in them; but from analogy I should infer that a thorough drenching with hot water would kill the plant-lice, and at the same time not injure the plant. Experiments, however, are required to establish the fact, and also to determine what degree of heat may be safely employed. In this, as in so many other cases, we need a series of experiments carefully tried by competent scientific authority. We know, however, from good French authority, that Bark-lice may be killed by hot water, without at all injuring the tree on which they occur.

Now let us suppose, for an instant, that all the multitudinous enemies of the Plant-lice, which have been enumerated above, were swept away from off the face of the earth by the besom of destruction. Then consider the enormous and almost inconceivable rate at which, as has been already shown, plant-lice naturally increase when unchecked and uncontrolled from any extraneous source. Think of all this, and then tremble when the inevitable inference is drawn, that but for these destroyers of the Plant-lice, the whole vegetable world would in six months be as brown and dry and desolate as the deserts of Sahara. All animal life depends either mediately or immediately upon vegetable life. Hence, the Vegetable Kingdom being destroyed, the Animal Kingdom would be involved in the same universal ruin; and man and all his proud works would perish from off the face of the globe. It may be to some a humiliating fact, but it is nevertheless demonstrably true, that upon the permanent well-being of a few small flies and beetles, which we every day crush ruthlessly under our feet, and which most of us consider as unworthy the notice of any but women and children, depends the very existence of that noble race of beings, that gave birth to Pericles and Thucydides—to Cromwell and Newton—to Gustavus and Linnæus—to Napoleon and LaPlace—and last but not least, to Washington and Franklin. B. D. W.

☞ If God could take pains to create an insect, man may take pains to study it, without lowering his dignity.

☞ There are probably ten times as many species of insects in the whole world as of all other animals put together. Hence, the Entomologist holds no sinecure office.

BIRDS *versus* INSECTS.

It has been the fashion for some years to maintain that all birds, or at all events all the smaller birds, are beneficial to the Agriculturist, because they prey more or less upon insects, and that all insects without exception are noxious vermin. Nothing can be further from the truth than these two propositions. There are many small birds that upon the whole do more harm than good, and some few whose works are evil always and continually. And on the other hand, out of a hundred distinct kinds or species of insects taken indiscriminately, at least twenty-five or one-fourth part will be found to be generally beneficial, by preying exclusively upon other insects, many of which are really noxious.

I know from personal experience, that the common American Crow will dig up young corn out of the hill, no matter how deeply it may be covered, for the sake of the kernel attached to the root. And I know likewise that the Swamp Blackbird (*Agelaius phœniceus*) will pull it up out of the hill for the same purpose, unless it be covered so deeply that the young blade breaks off instead of fetching up the root along with it. For three long weeks, when I first opened a farm in the midst of wild land in Henry Co., Ill., more than a quarter of a century ago, I had to be in my corn-fields at the first peep of day with my gun, to save the crop from the crows; and a hard battle I had to fight with them, though by patience and perseverence I came out victorious in the end. And yet, in the face of the strongest evidence, there are writers to be found, who deny that crows and blackbirds pull up young corn for the sake of the seed-kernel, and assert that it is only "a worm at the root" that they are in search of!! (*Md. Farmer*, April 1866 p. 106.) But surely in that case the bird would only attack a hill here and there, whereas both crows and blackbirds will follow along a row of corn, and gut every hill as they go. Again, crows will dig into the tips of young ears of corn when they are in the milk, so as to destroy at least a fourth part of each ear, by the consequent exposure to the weather; and when the ear is ripe they join the prairie-hens in stripping it of its kernels by wholesale. Yet, on the other hand, it is probable that all these birds devour at particular seasons of the year many noxious insects; so that to find out whether each is to be considered, upon the whole, as a friend or as an enemy to the Farmer, we must draw up a careful Debtor and Creditor account, and ascertain on which side the balance lies.

Take another well-known bird—the Orchard Oriole (Icterus spurius). Dr. Trimble says that it knows how to find the leaf-rolling caterpillars in their places of concealment, and other authors report it as a very general insect-feeder. We should suppose therefore that it would be a welcome guest in every orchard. Yet this is what one of the most intelligent and successful fruit-growers in Illinois, Dr. Hull of Alton, says of this bird:—

> The oriole is a very destructive bird—too expensive to

> tolerate in any way. We cannot admit of them. The oriole commences with the first fruit that ripens. He takes the cherry, feeds upon that during its season and will destroy a hundred at one meal. Then he takes to the plums. He comes in upon one side of the tree. Always works under cover. After destroying his hundred cherries he flies away, then comes back and destroys another hundred. He does not eat so many as he taps and destroys, and that is what we complain of. After he is done with the plums, the grapes begin to ripen. I could not pick a bushel of grapes if I did not destroy these birds.

Even the Baltimore Oriole, or Hanging Bird, which by the laws of Illinois we are forbidden to kill under a penalty of $5, and which Dr. Trimble says ought to be spared because he eats Curculios, (*Fruit Insects*, pp. 77 and 85,) is, according to Dr. Hull, no better than he should be. In a letter to me the Doctor writes as follows respecting this bird:

> I am sorry that I cannot say that either of the Orioles are as honest as they should be. It is the Baltimore Oriole that our Alton Horticultural Society proscribed. I have had hundreds of them shot [you must be fined one thousand dollars for this, Doctor!], and repeatedly examined their craws, and in no instance have I found cause to suspect that they were smart enough to catch a Curculio. This they *may* do, however, as I have two or three times found a solitary Pea-bug among the contents of their craws. I have been specially attentive to the habits of this bird, as a destroyer of Noxious Insects; and am compelled to believe that an energetic Horticulturist will, in one hour, destroy more of our insect enemies, than these birds will do in a whole season.

Nay, even the Cedar-birds, (Ampelis cedrorum,) which the most enthusiastic Protectors of the Small birds have generally devoted to destruction, as an unmitigated pest, find an advocate in the person of Dr. Trimble, who kindly speaks a good word for them and says that they eat cankerworms. (*Fruit Insects*, p. 26.) Perhaps they do; but that is not the real question. The real practical question is —How many cankerworms do they eat for every bushel of fruit that they eat or otherwise destroy?

Many years ago I saw a Paper by a New England Naturalist, stating that he had examined the craws of a great number of Robins (Turdus migratorius), and that they contained vast numbers of a certain larva which he had forwarded to Dr. Fitch, and which was pronounced by that gentleman to be that of the *Bibio albipennis* of Say. Hence he drew the inevitable inference which almost all these Bird Protectors jump to, namely that the Robin must be a very useful bird; for he proved, by arithmetical calculations, that it destroyed in the course of the whole season I don't know how many millions of "*Bibio albipennis*." As, however, he stated nothing whatever respecting the habits and history of this insect, I will now supply the deficiency. *Bibio albipennis*, or the White-winged Bibio, is a sluggish, slow-flying, blackish, two-winged fly, about the size of a common House-fly, but much slenderer, which swarms in gardens among fruit-trees and fruit-bearing bushes in the spring. Its larva—I have bred hundreds of them to the perfect Fly—lives upon damp dead leaves, and is therefore perfectly harmless, and so is the Fly bred from it. Consequently, even if the Robin annihilated this insect entirely, it would not benefit mankind. On the other hand, the Robin is confessedly death upon cherries and certain other fruits. Whether, on the whole, this bird be beneficial to the Agriculturist, cannot be decided without further and better evidence. In any case we want some more cogent proof than the *Bibio albipennis* argument, before we acquit this culprit.

As to the N. A. Woodpeckers—another bird which the laws of Illinois forbid us to kill—they appear to be divisible into three categories. The great bulk of them feed almost exclusively upon insects, and chiefly upon such species as bore into timber, though a few of these will sometimes eat corn. There are other species which superadd to these habits a propensity for devouring fruits of different kinds—the golden-winged Woodpecker, Yellow-Hammer or Flicker (Picus auratus), the Red-headed Woodpecker (Picus erythrocephalus), and the Pileated Woodpecker (Picus pileatus). And there is a single species, the Yellow-bellied Woodpecker (Sphyrapicus varius)—generally known as the "Sapsucker," though many writers incorrectly give this name to the innocent Downy Woodpecker, Picus pubescens—which bores horizontal rows of holes in the bark of various trees, for the sake of the sappy inside bark which he extracts from the bottom thereof.* The first group are universal friends; the second are obnoxious to the fruit-grower, but otherwise useful; the last is to be exterminated without mercy wherever he is found, even in the judgment of Dr. Hoy of Wisconsin, who was the first to demonstrate scientifically the very peculiar habits of the species.

But it does not follow, because a particular species of bird feeds exclusively upon insects, never molesting the Farmer's grain or the Orchardist's fruit, that therefore it must necessarily be beneficial to mankind. We must prove in addition that it destroys a great many more plant-feeding insects, than it does Cannibal and Parasitic insects, before its good character can be considered as firmly established. And this is where the evidence almost universally breaks down, and where a long series of careful experiments is required, before we can arrive at any definite conclusion on the subject. Many years ago I saw a French work, giving an account of the contents of the craws of a great variety of European small birds, of each of which numerous specimens had been killed and dissected for that express purpose. The author was a zealous advocate for the preservation of birds, but though doubtless a good ornithologist he appears to have known but little about Entomology. For among the noxious insects which he enumerated with great gusto, as found in the craws of his little friends, he mentioned many species, for example the *Agrion* or Devil's Darning Needles, which are decidedly beneficial by preying upon noxious insects. Again, no group of birds is more exclusively insectivorous than the Swallows; for they none of them ever touch either fruit or grain or any other crop. At first sight, therefore,

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*As this fact is still disbelieved by some, and was formerly disbelieved by myself, it may be as well to add, that Dr. Hull says that he has several times actually found cambium in the bill and in the crop of this bird. (*Agric. Rep. Mo.* Append. p. 345.)

we should be inclined to characterize them as universally beneficial to mankind. Yet on one occasion, as I was advancing, net in hand, to capture a large Dragon-fly (*Anax junius*), a Bank Swallow (Hirundo riparia), just as I was only a yard or two from my game, swooped in like a flash of lightning under my very nose and robbed me of my prey. Now I incline to believe that this large insect devours as many Flies, Gnats and Musketoes in the course of a day as the Swallow could have done; and if so, there was certainly a heavy item to be posted up against the bird on the Debtor side of the account.*

On the whole—putting any damage done to the Farmer's grain and corn, or to the Orchardist's fruit, out of the question for the present—I do not think that we are entitled to assume that any particular species of bird is a Public Benefactor, until we know by the results of numerous experiments, not only that it feeds upon insects, but that it destroys at the very least thirty times as many Noxious Insects as it does Beneficial Insects. For assuming, what I believe to be very near the truth, that the number of Noxious Species of Insects is to that of Beneficial Species as three to one, we must also take into account the further fact that, on the average, Noxious or Plant-feeding species are very much more numerous in individuals than those species which prey on them, just as in most places the Rats and Mice greatly outnumber the Cats. Suppose that, on the average, they are ten times as numerous, which is certainly, I think, much within bounds. Then it will follow that, out of a large lot of individual insects indiscriminately captured, the plant-feeding or injurious individuals will be on the average thirty times as numerous as the individuals that prey on them, the plant-feeding species by the supposition being thrice as numerous, and the individuals of each plant-feeding species on the average ten times as numerous. Hence it results that, unless an insect-devouring bird is found to destroy considerably more than thirty times as many Noxious Insects as it does Beneficial Insects, it is not on the whole useful to man; and if it destroys considerably less than the above proportion, it is decidedly injurious to man. For in the latter case, instead of inclining Nature's scales in favor of the Agriculturist, it inclines them the other way; and if the same process were repeated by other birds to an indefinite extent upon all sides, the final result would be that every Beneficial Insect would be swept away from off the face of the earth, while there would be a large residuum of Noxious Insects to increase and multiply in future seasons, without any check whatever from their Insect foes.

Mr. J. A. Allen, of Massachusetts, has obligingly furnished me with the following list of birds, which he has observed to prey on the Apple-tree Plant-louse during the autumn months and especially in October: The Pine Finch (Chrysomitus pinus), the Yellow-Bird (Chrysomitus tristis), the Purple Finch (Carpodacus purpureus), the Snow-Bird (Junco hyemalis), the Field Sparrow (Spizella pusilla), the Chipping Sparrow (Sp. socialis), the Tree Sparrow (Sp. monticola), the Song Sparrow (Melospiza melodia), and the White-throated Sparrow (Gonotrichia albicollis). As Mr. Allen expressly states, that he found plant-lice in the stomachs of many of these birds on dissection, there can be no doubt of the fact that they eat Plant-lice. But do they not also eat those bitter enemies of the Plant-lice, the larvæ of the Ladybirds and of the Lace-wing Flies and of the *Syrphus* flies? To refuse a good fat fleshy white *Syrphus* maggot, when it lies just under his bill, would, I suspect, require more philanthropic self-control, than mortal Sparrow was ever yet possessed of. And perhaps—if I may be pardoned for such a malignant and slanderous supposition—some of Mr. Allen's birds took the *Syrphus* maggots exclusively, and refused the Plant-lice, as "too small business" to bother their beaks with.

A great deal has been said of late, about importing into this country the European House Sparrow to destroy our insect enemies, and according to my venerable friend, Dr. Kirtland, of Ohio, "it is now breeding successfully on Staten Island, N. Y." (*N. Y. Trib.* Feb. 2, 1866.) But I agree with a writer in the *Horticulturist*, (Nov. 1866,) that we ought to think twice before we import a bird of so doubtful a character. So far as a recollection of thirty years standing goes, the House Sparrow is an unmitigated pest in England in Farmers' Stack-yards, pertinaciously pulling out the straws one by one from a grain-stack, and feeding at his leisure upon the grain which he thus secures for his own liquorish chops. It is not, however, the European House Sparrow, as the writer in the *Horticulturist* suggests, but the European Bullfinch that feeds upon tender fruit-buds in early spring, before they expand into blossom. Many a time, when I was a schoolboy of eight years old in a Village School in England, have I seen my worthy schoolmaster rise in hot haste from his elevated chair in April and May, to scare away the Bullfinches out of his Gooseberry bushes.*

There is one fact which has always struck me as adverse to the fashionable theory, that, without the presence of numerous small birds, noxious insects cannot effectually be checked. Throughout a space of three or four miles round Rock Island, Ill., there is scarcely a small bird of any kind to be met with at any time of the year, except Swallows and Martins and birds of passage on their travels, in consequence of the hosts of idle gunners from the city who are all the time making war upon them. Yet I could never perceive that Noxious Insects are more numerous or more destructive in this vicinity, than in localities where small birds abound. Possibly, however, this may be due to the insect-devouring propensities of the very large number of Dragonflies, or Snake-feeders as they are absurdly called, (*Libellula* family,) and Devils Darning Needles, (*Agrion* family,) which breed in the rivers that surround us on both sides, and in our numerous Bayous and Swamps.

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* Mr. Glover, the Entomologist of the Agricultural Bureau, found the stomachs both of humming birds and of robins to contain spiders. Now spiders are universally carnivorous, and, so far as they prey upon noxious species of insects, beneficial to the Agriculturist. Again, in the stomach of a Red-bellied Woodpecker killed in December he found a species of wasp belonging to the genus *Polistes*. Now I have myself seen in South Illinois *Polistes rubiginosus* (St. Fargeau) devouring a green caterpillar ¾ inch long, and probably other species of the genus have similar habits. (See *Agric. Rep.* 1865, pp. 38, 39.)

* According to Mr. Glover, we have birds in North America with the same habits as the European Bullfinch. For the Purple Finch or American Linnet is said by him to feed very largely on the fruit-buds of the peach; and according to the same writer, "the Ruffed Grouse, or Pheasant of the middle and western States, and Partridge of the north, sometimes does much damage to orchards by devouring the buds of apple-trees." (*Agr. Rep.* 1865, pp. 41, 44.)

B. D. W.

ANSWERS TO CORRESPONDENTS.

J. Pettit, C. W.—Your insects are named as follows: 1*st. Elaphrus cicatricosus* Lec. 2*nd. Lebia scapularis* Dej. 3*rd. Helophorus scaber* Leconte, kindly determined by the describer. 4th. A variety of *Clerus nigripes* Say, according to Leconte, to whom I forwarded a specimen. It differs from the normal form in the anterior ½ of the abdomen and elytra and the entire head and thorax being black instead of red both above and below. Several years ago I took hundreds of specimens of the true *nigripes* off an ash-tree in April, where the larva had evidently been preying upon the larva of *Hylesinus aculeatus* Say, which occurred on the same tree in similar profusion, issuing out of numerous holes in the solid wood. *Every one* of these specimens was of the normal color, with no perceptible variation. Hence, I am disposed to regard the so-called variety as a distinct form. Whether or not you choose to call it a distinct species, depends upon the meaning you choose to attach to the word "species;" and, after all, is merely a question of words and not a question of facts. For myself, I fully believe that these two forms, as well as all the species of the genus *Clerus*, are aboriginally descended from common parents. But still, as they do not appear to graduate into one another, or to occur in company with each other, I should call them distinct species, though the differences are merely colorational; just as I believe, with all the best authors, that *Colias philodice* is specifically distinct from *C. eurytheme*, though these two butterflies merely differ in the one being sulphur-yellow and the other a deep rich orange-color. 5*th. Hydnocera pallipennis* Say. 6*th. Photinus neglectus* Lec. 7*th. Anobium notatum* Say. I thought Say's description rather inapplicable, but Dr. LeConte tells me that he has typical specimens from Melsheimer and that it is rightly named. 8*th. Cryptarcha ampla* Erichs. 9*th. Platydema flavipes* Fabr. 10*th. Gaurotes cyanipennis* Say. 11*th. Leptura capitata* Newman, determined by LeConte. Very like *L. americana* Hald., of which I took last year many specimens issuing out of a decayed white Elm, but differs in being much smaller, in the elytra being much more coarsely punctured, and especially in the space behind the eyes being much less inflated. 12*th. Adimonia externa* Say. 13*th. Tingis ciliata* Say. You say that you found this little Bug "in great numbers under the bark of Buttonwood [or Sycamore] trees, in the winter, but that you never met with it in the summer." You will find it in the latter part of the summer, in profusion, on the under surface of the leaves of the same tree, in company with its larva, lazily sucking the sap therefrom just like an *Aphis*. I was not previously aware that this insect hybernated in the imago state, and the fact is an interesting one. Many *Aphis*, and probably all that feed upon annual plants which perish in the autumn, hybernate in the imago state. Otherwise it would be difficult for such species to survive from year to year.

Of the above 13 insects, Nos. 2, 5, 6, 8 and 13 are common with me. Nos. 1 and 12 are very rare with me. Nos. 9 and 10 do not occur in Illinois, so far as I know. And Nos. 3, 4, 7 and 11 are new to my collection. I shall be pleased to hear again from you, as often as you wish.

Miss Marion Hobart, Ill.—The apple-tree Barklouse which you send is the terrible Imported Barklouse, (*Aspidiotus conchiformis*,) which is just reaching the western extremity of Northern Illinois in the course of its travels westward. When first introduced into any neighborhood, it is certain death to any tree that it attacks, unless artificially destroyed; but in the course of seven or eight years, the Ladybirds that prey on it increase so much as to measurably check it. In a paper which appeared, with illustrations, in the last number of the PRACTICAL ENTOMOLOGIST, p. 32, I have given the best directions in my power for destroying this abominable pest; but to make the thing complete, there is required a series of experiments which would absorb much time and trouble, and which at present it is "nobody's business" to make.

The "small oval black shining objects" nearly twice as long as wide, and when immature of a grass-green color, are, as you rightly suppose, the eggs of the common Plantlouse of the Apple-tree, (*Aphis mali*). On the general subject of these Plantlice, I have prepared a long illustrated Paper, which appears in this number of the PRACTICAL ENTOMOLOGIST. Ladybirds are said to feed upon plantlice, eggs of insects, &c., in the perfect or beetle state, but not to nearly so great an extent as their larvæ do.

Geo. Scarborough, Kansas.—If you wish to go deeper into Entomology than the works you already have enable you to do, you had best take up some particular Order of Insects to begin with. Otherwise the field is so enormously wide, that it would require a whole Number of the PRACTICAL ENTOMOLOGIST to catalogue the requisite books. Many of these books, too, are in Latin, French and German, and I do not know whether you read these languages. Coleoptera is the only Order of Insects that has as yet been tolerably well worked out in this Country; and even in that Order there are some groups, for example the Snout-beetles (*Curculio* family), about which comparatively little is known by any N. A. Entomologist. Say's works treat pretty fully of all the Orders except Lepidoptera, and contain many colored plates; but you cannot use Say to any good advantage without a previous knowledge of other authors. The price of his Entomological Works is $20, and they may be had of Bailliere Brothers, New York. Even in England, where Entomology has been extensively studied for more than half a century, they have no reliable work which treats exhaustively of all known English Insects, as Gray's Botany does of all Phanerogamic Plants found within a certain district in the United States. And even in England there are only a few Orders of Insects—Coleoptera and Lepidoptera and to a certain extent, Hymenoptera—that have been pretty well worked out. You must not be surprised therefore, that the Entomological Student is surrounded on all sides by difficulties in this country, where ten years ago an Entomologist was almost as rare a bird as a Black Swan.

☞ Answers to Thomas T. Smith, W. C. Fish, George Haines, C. Moran and L. D. Morse will be given in the next number.

Fruit-growers' Associations.

One of the most practically useful movements of the day, is the formation of Local Associations among men devoted to Fruit-growing in various parts of the country. By this means, not only is the experience of each individual member thrown into the common stock, but by the adoption of proper rules and regulations, they are enabled to concentrate their energies against any particular Noxious Insect. For example, if only a single Orchardist destroys all the Caterpillar nests on his apple-trees, it does comparatively but little good; but if a whole neighborhood unite in so doing, the caterpillar will soon become quite scarce. The Fruit-growers' Association, of South Illinois, held a very interesting meeting in December, 1866; and we notice that the Lake Shore Grape-growers' Association will meet at Cleveland, Ohio, on the 3rd Wednesday of February, 1867. Success to them both.

Errata.

Vol. II, Page 27, column 2, line 7 from bottom, before "6th, *Trogosita*" insert "5th, *Calandra* (*Sitophilus*) *granaria*, the Grain Weevil."

Page 35, column 1, line 15, for "1861" read "1867."

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THE

Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

Vol. II, No. 5. FEBRUARY, 1867. Whole No. 17.

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☞ **INDEX TO VOLUME 1.**—At the time No. 12, of Vol. 1 of the Practical Entomologist was printed, it had not been decided whether to close the Volume with that number, or to continue it to the end of the second year; under those circumstances *our Index and Title* were not issued. But having since concluded to commence a new volume with the second years' issue, an Index and Title page to Volume 1 have been printed, and will be furnished to those wishing a copy.

NOTICE.

☞ We are compelled to discontinue the Practical Entomologist to several subscribers who have failed up to this day to remit their subscription money. This is probably a mere oversight on their part; but labor and materials are too high, and our terms are too low, for us send the Practical Entomologist to any one on credit.

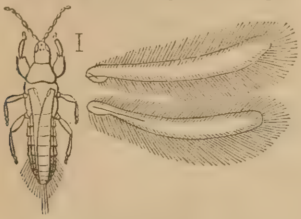
PHILADELPHIA, FEBRUARY, 1867.

The TRUE THRIPS and the BOGUS THRIPS.

Throughout the Valley of the Mississippi, vine-growers and others in their Horticultural Meetings are perpetually speaking of the "Thrips," as an insect very destructive to the grape-vine. Some of them, indeed, occasionally call it a "Thrip," erroneously supposing that "Thrip" is the singular form and "Thrips" the plural form of one and the same noun; just as young beginners will sometimes talk of a "specie" of insects, supposing "specie" to be the singular and "species" the plural; and just as I once heard an indignant Irishman exclaim—"Faith, now, Judy, and you are a disgrace to your 'seck' entirely"—Paddy supposing that "seck" was the singular form and "sex" the plural. What particular species of insect is thus designated by Western Horticulturists, and even to what Order of Insects it belongs, is still a profound mystery to the Entomological world. I have, time and again, in the columns of the Practical Entomologist, requested vine-growers to send me specimens, in order that the enigma might be solved. But no one has yet taken the trouble to comply with my request. Since, therefore, the mountain will not come to Mahomet, Mahomet must go to the mountain. Since the vine-growers will not explain to me what they mean by a "Thrips," I will show them pictures of two very distinct species of insects, one or other of which has probably been mistaken by them for a true "Thrips;" and I will also show them a picture of a true "Thrips," that they may see how very different it is from any insect that really infests the Grape-vine.

Centuries ago, when Catholic Bishops sometimes went into the army, like the notorious Bishop Polk of confederate memory, a certain holy Bishop had been taken prisoner on the field of battle by a King of England. Forthwith the Pope of Rome demanded, that his dear son in God should be released without price and without ransom. By way of practical answer, the King sent to the Pope the blood-stained cuirass of the Prelate, with the puzzling question—"Judge thou, if this be thy son's coat or not." So now do I send the picture of the true "Thrips" to the vine-growers, and enquire of them—"Judge ye, if this be the image of your foe, or whether you have not confounded one of your best friends with one of your bitterest enemies."

The true *Thrips* of Entomologists, of which the annexed highly-magnified figure will give a very good idea—the hair-line showing its real length, and the two wings on the right side being still more highly magnified, and detached from the body to show their hairy fringes—is an exceedingly minute, four-winged, active, blackish insect. In the larva or imperfect state it differs chiefly in having no wings, and in being then of a reddish or purplish color, like the larva of a Chinch-bug, (*Micropus leucopterus* Say.) There are a great many species of them, belonging to different genera of the *Thrips* family; but as no one hitherto has investigated and named our common North American species, we may for the present call them all *Thrips.*



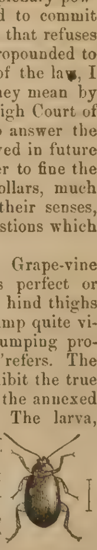
Color—blackish.

Naturalists hitherto had always supposed, that these *Thrips* were vegetable-feeders and injurious to plants. In the *Proceedings* (III, pp. 611—612) I suggested "that they are generally, if not universally, insectivorous, and that those that occur on the ears of the wheat, both in the United States and in Europe, are preying there upon the eggs or larvæ of the Wheat Midge (*Diplosis tritici*), and are consequently not the foes, as has been generally imagined, but the friends of the farmer." At the conclusion of this passage I gave several reasons for my belief; and I have since found *Thrips* preying upon the gall-making larvæ of more than twenty different galls, growing on different trees and other plants; so that there is now no manner of doubt in my mind, that *Thrips* is a true Cannibal insect. The importance of this discovery may be seen at once. The larva of a minute flea-beetle (*Haltica*) often grievously infests clover-blossoms, feeding upon and destroying a large portion of the seed. A *Thrips* occurs also sometimes in large numbers on these same blossoms. Hitherto, farmers, when they detected *Thrips* on their clover, had supposed that a new enemy was invading it. Now, when they see the *Thrips* there, they may go to bed and sleep comfortably, satisfied that the depredations of the real enemy are about to be checked. And in the same way, whenever in wheat fields infested by the larva of the Wheat Midge, (popularly known in the East as the "Milk Weevil" and in the West as the "Red Weevil,") *Thrips* are discovered in the ears of the infested grain, the farmer may know that a friend has come to his rescue, and that the Great Author of Nature is saying to the little pest, through the mouth of the minute and almost microscopic insect which He has appointed to do His work—"Thus far shalt thou go, but no farther, and here shall this grievous Plague of Flies be stayed."

I may remark here, that I have found a few *Thrips* haunting the leaf-galls, which have so abounded everywhere in 1866 on the Clinton grape-vine, and which have been named *vitifoliæ* by Dr. Fitch.* There can be little doubt that they were preying here upon the minute Barklouse, which produces this leaf-gall. I have also noticed them to be very abundant in the flowers of the Bracted Bindweed, (Calystegia sepium.) As a small plant feeding beetle (the *Conotelus obscurus* of Erichson) also occurs in great numbers in the same flowers, it is not improbable that the *Thrips* may feed upon its larva.

So much for the true *Thrips.* Now for a notice of the two very distinct insects, which I *guess* to have been mistaken for *Thrips* by the vine-growers. I am sorry that I can only *guess* in this matter. But it is not I, but Congress that is to blame here. Congress ought to have long ago invested the PRACTICAL ENTOMOLOGIST with plenary power to send for persons and papers, and to commit any body to jail, for contempt of court, that refuses to answer such questions as may be propounded to him. In the present inefficient state of the law, I ask the vine-growers what on earth they mean by a "Thrips?" They defy the Great High Court of Science, and contemptuously refuse to answer the question. And yet—will it be believed in future ages?—the Court has not even power to fine the recusant witnesses a few thousand dollars, much less imprison them till they come to their senses, and humbly answer the important questions which have been propounded to them.

The annexed figure represents the Grape-vine Flea-beetle, (*Haltica chalybea,*) in its perfect or winged state. As will be noticed, the hind thighs are enlarged, so that the insect can jump quite vigorously; and of course it is to this jumping propensity that the name of "Flea-beetle" refers. The figure is considerably magnified, to exhibit the true shape and structure of the insect, but the annexed hair-line shows its natural length. The larva, (which is not shown in the figure,) is light-brown, with numerous rows of black spots, and has six legs in front and a pro-leg or sham leg at its tail. Except that it is of course much smaller, it is not very unlike the larva of the New or Colorado Potato Bug, as figured in the PRACTICAL ENTOMOLOGIST (Vol II, p. 13.) In April this larva



Color—steel-blue.

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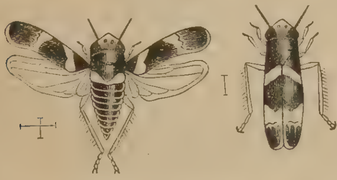
* According to the great Missouri Vine-grower, Mr. Geo. Husmann, this same gall is also found on the Taylor grape-vine. As I have already stated, I also found it in limited numbers on the Delaware grape-vine. It does not appear to occur on any other cultivated variety: so that Dr. Shimer's apprehensions that it will eventually prove as destructive to the grape-vine, as the Barklouse is to the Apple-tree, are measurably unfounded. (See P. E. II, p. 18.)

is very hard on the buds of the grape-vine, and afterwards on the leaves. Those who wish to know more about it, are referred to an excellent article on this insect by Mr. J. Kirkpatrick, which has been reprinted in the PRACTICAL ENTOMOLOGIST (I, p. 40.)

Well, Messieurs vine-growers, is this your *Thrips?* I should say it must be Mr. Meeker's *Thrips*, because he expressly says that his "Thrips" "eats the leaves till they appear like shreds," (see PRACTICAL ENTOMOLOGIST, Vol. I, pp. 21—2,) and the insect to be next noticed has no jaws at all to eat with, only a beak to suck sap with. Likely enough, however, different vine-growers call different insects by one and the same name—"Thrips." So we will 'bout ship and try another tack.

The annexed figure represents the Leaf-hopper of the Grape-vine, the *Tettigonia* (*erythroneura*) *vitis* of Harris. That to the left shows the perfect insect with expanded wings; that to the right the same insect with its wings closed. The hair-lines show the natural length of the insect, the figures themselves being considerably magnified. In Harris's *Injurious Insects* (Plate III, fig. 5,) may be found a very poor colored figure of this same species, but the wings, as represented there, are out of all drawing, and the coloring is exaggerated. This Leaf-hopper is one out of five quite distinct species—all belonging to the same genus, and all of the same shape and size, but differing in their coloring—which often swarm in varied proportions on the leaves of the grape-vine in the U. S. Two of the five have been described by Dr. Fitch as *Erythroneura vulnerata* and *E. tricincta*, and two by myself as *E. ziczac* and *E. 8-notata;* and I have recently received from Canada two other species, also distinguished by their coloring alone, which are as yet undescribed and unnamed, and which swarm there on the grape-vine in company with some of our U. S. species. In all the above species the larva differs from the perfect winged insect chiefly in having no wings, and is equally destructive to the vine, pumping away in great crowds at the sap upon the lower surface of the leaf, and causing there numerous brown dead spots, so as to often kill the leaf entirely, and sometimes, when the insects are exceedingly abundant, to kill the whole vine. Both larva and perfect insects jump like any flea, but of course it is only the perfect winged insect that has the power of flying. Unlike the Flea-beetle that we were looking at just now, the hind thighs are not thickened, but the entire hind leg is greatly elongated and armed with rows of little thorns, as in the Grasshoppers, which enables it to jump with great vigor. Like almost all other species belonging to the Order Homoptera, they have a peculiar habit of running sideways like a Crab; and when they see you looking at them upon one side of a leaf, they will often dodge round quickly to the other side, as a squrrel dodges round to the opposite side of the trunk of a tree when he sees that he is noticed. Insects are more wide-awake than people generally suppose. The high and low vulgar despise them because they are comparatively small. But their habits are as interesting, and their structure as complicated and wonderful, as those of the higher and larger animals. In some cases their structure is even more complicated than in the higher animals; for Lyonnet demonstrated that there were 4000 distinct muscles in the body of a single caterpillar, and in Man—the highest of created animals—there are only 529 muscles. God took just as much pains in making one of these poor despised little creatures, as in making a Whale or an Elephant. Yet he that dissects an Elephant is, in the popular eye, a distinguished and a learned man, and he that dissects a Fly is a fool and a "bug-hunter!"



Colors, pale-yellow and blood-brown.

I said just now, that there were no less than seven distinct species of Leaf-hoppers, all of the same shape and size, but differing in coloration, which commonly infested the Grape-vine in North America. "But," some one will reply, "may not some of these seven be mere varieties, and not true species?" The answer is, that I have carefully compared together scores, and in some cases hundreds of each supposed species, taken on the same day, off the same grape-vine, and clearly ascertained that there are no intermediate grades, and that one supposed species does not fade away gradually into another. Neither can it be the case, that any two supposed species are merely the opposite sexes of one and the same species; for in this whole Order of Insects the sexes are distinguished with the greatest ease, and both males and females are found belonging to each of the seven species referred to above. Hence we may infer with certainty that they are true species, not mere varieties, and that each species, as a general rule, interbreeds with itself alone. For, if any two of the seven bred promiscuously with one another, we should inevitably often find intermediate varieties; just as when you cross a Fantail Pigeon with a Tumbler Pigeon, you produce a mongrel pigeon which is neither Fantail nor Tumbler, but something intermediate between the two.

And now once more, Messieurs Vine-growers, is this your "Thrips?" Or, if neither of the above two is your "Thrips," what in heaven's name is it?

Postscript.—Since the above was in type, the mystery has been cleared up—the enigma has been unriddled—and like Archimedes, when he had solved his knotty problem, we may exclaim EUREKA! The so-called "Thrip" of the Western vine-growers, as it turns out, is really nothing but Grape-vine Leaf-hopper, (*Tettigonia vitis*)—at least so says the Committee on Entomology in their Report to the Missouri State Horticultural Society. (*Agr. Rep. Missouri*, 1865, App. p. 342.) Now then at last we know what a "Thrip" is; and the patient reader, who has joined me in this Pursuit of Knowledge under Difficulties, can see the picture of a veritable "Thrip" above. Prettily as he is spotted, he is a very ugly beast to have in great swarms on one's grape-vines. B. D. W.

UNIVERSAL REMEDIES.

There is scarcely a quack medicine advertised in the newspapers, that is not good for some disease or other, under some peculiar circumstances. The mischief is, that such remedies are usually advertised, as being sure to cure all diseases whatever under all imaginable circumstances. Gout, rheumatism, neuralgia, dyspepsia, pains in the head and pains in the great toe, softening of the brain and ossification of the heart, are all warranted to be cured by the same Infallible and Universal Elixir. Just so with noxious insects. We perpetually see remedies proposed, not for the destruction of some particular insect, the habits and history of which have become well known, but for the extirpation of all insects indiscriminately, no matter what their peculiarities may be. With philosophers of this description the whole vast world of insects is comprehended under the genus "Bug," while in the larva state it is classified under the genus "Worm," sometimes, for the sake of variety and euphony called "Grub;" but whether the "Bug" develops into the "Worm," or the reverse, or sometimes one and sometimes the other, "the said deponent sayeth not." Take the following, for instance, which is now going the rounds of the Agricultural Press, as an amusing specimen of a universal remedy against the genus "Worm:"

> Protecting Trees Against Worms.—The bandage system, which we were the first to suggest some fifteen years ago, and often referred to since, is the only effectual protection we have yet seen against the operations of the worm in fruit trees. We repeat again, that in not a single instance have we ever had a worm in our dwarf pear trees, where this system was properly followed. It is simply to bandage the bottom of the tree with any kind of muslin or cloth, and tie it, letting the bandage be about six inches above ground and two inches below. It should be applied in February, or as soon as the ground is in a fit condition to go upon. These bandages should be removed at the end of October. As long as this is continued we defy the worm. The bug lays its eggs an inch or two above the ground, early in the spring, that is, as soon as the warm days in March will admit of its coming forth from its winter quarters; the eggs are soon hatched by the sun, being laid on the sunny-side of the trunk, and the young grub finds its way down to the soft bark beneath the soil, where it gradually works its way in. The bandage prevents both the laying of the eggs and the descent of the grub. Let doubters try it. One man will bandage two hundred trees in a day. We have no doubt it will also protect the peach tree in the same way.

"The worm in fruit-trees!!!" As if fruit trees were not afflicted by hundreds of different "worms," differing from each other in size, shape, color, habits, length of life, time of coming to maturity, &c., as much as a Horse differs from a Hog! Yet the universal Bandage System is warranted to kill them all. Does the Apple-worm bore your apples? Bandage the but of the tree and he perisheth forthwith. Does the Web-worm spin his web in the branches? Bandage the but, and he dieth immediately. Does the caterpillar known as the Red-humped Prominent, or the Yellow-necked worm, strip the leaves off? Bandage the but, and *hey presto!* he quitteth his evil ways. Does the Buprestis Borer bore into the upper part of the trunk or into the branches? Still you must bandage the but with the same universal calico, and in a twinkling he vamoseth the ranch. Be the disease what it will, the Universal Patent Never-failing Pill is certain-sure to extirpate it—provided you take pills enough. In the words of the advertisement, "As long as this is continued, we defy the worm." In obstinate cases, it may perhaps be necessary to bandage the whole tree—trunk, branches, twigs and all—but if you only apply bandages enough, the Great Bandage Anthelmintic Vermifuge is sure to be a specific against the genus "Worm." The genus "Bug" may perhaps require a distinct prescription—something in the nature of a Cataplasm or an Emollient Lotion.

In sober serious earnest, this "Bandage system" is available against just two, and only two insects —the striped Borer of the Apple-tree (*Saperda bivittata*), and the Peach-tree Borer (*Trochilium exitiosum*). In both these two species, the mother insect has the habit of laying its eggs almost exclusively at the but of the infested tree, and any such substance as tarred paper, cloth bandages, straw wrappings or the like, placed on the but of the tree, prevents that mother insect from reaching the particular spot, where Nature directs her to deposit her eggs. Limited in this manner, the remedy is as old as the hills, and would not be sufficiently "sensational" to be copied by a single Agricultural Journal. Blazoned forth as a universal remedy against every species of the great genus "Worm," it tickles the popular palate, and runs like wildfire through the Agricultural Press. In the former case it is indeed true—but then it does not make the reader open his eyes wide with astonishment. In the latter case it is an absolute and unmitigated falsehood; but then it makes people stare and crowd into the Circus-tent, to see the wonderful performance; and in the meantime the Ticket-seller has his hands full of business.

Long live King Humbug! He still feeds fools on flapdoodle, and many of them have large and flourishing families, who will perpetuate the breed to the remotest generation. B. D. W.

POISONING NOXIOUS INSECTS.

The following is from a correspondent of the Agricultural Bureau, in Trimble Co., Kentucky, and appears in the Monthly Report for September, 1866, p. 343:

> "The tobacco worm is the most formidable adversary the farmer has to contend against in the culture of the weed, and this season many planters in this country and elsewhere, are providing and administering poison to the fly which lays the egg. The process generally pursued is to drop a few drops of ratsbane, or other poison, in a liquid form, into the flower of the Jamestown weed, wild morning-glory, &c., into which they are sure to insert their large bills and die almost instantly.—With the death of each fly, or miller, as they are termed, three to five hundred eggs are destroyed, each of which produces a worm."

This is an entirely new idea, so far as I know, and may probably be carried out in other directions so as to prove very serviceable. For example, the notorious Cotton Caterpillar or Cotton Army-worm, (*Anomis* [*noctua*] *xylina* Say,) which has this year done millions of dollars' worth of damage to the Cotton crop, is treble-brooded, the first brood of larvæ appearing towards the end of June and during July, and hatching out from eggs deposited by those few moths which have managed to survive the winter; as is also the case with the common house fly, the different meat-flies, &c. Now, if this first brood can be wholly or partially destroyed, either in the larva or moth state, it is evident that in a proportionate degree the propagation of the two succeeding broods will be put a stop to, and the evil nipped in the bud. In order to effect this, I should recommend a quantity of coarse molasses —the coarser and ranker the better—to be mixed with a little rum and a small quantity of some poisonous drug in a fluid state. Then, at the time of the year when the first brood of the cotton moths may be expected to make their appearance, and especially on warm, dark, cloudy evenings, when all these night-flying moths come out in great force, smear the mixture on the trunks of trees, or on a few boards set up for the purpose, in the cotton fields. The moths will be attracted by the smell of the rum and the sweet taste of the molasses, and will fall victims to their own gluttony. Of course, if every female cotton moth could be thus destroyed before it laid any eggs at all, the further breeding of this pest of the cotton-planter would be definitively checked. But as this, under ordinary circumstances, is not likely to be the case, it would be advisable to repeat the process through the whole season.*

For many years back, collectors in England have practiced this method of attracting certain night-flying moths, omitting, of course, the poison, as their object is merely to attract the moths, and the killing them is accomplished by other methods, which it is not necessary here to particularize. The idea was first suggested by an English collector's having found that certain moths were attracted in large numbers by an empty sugar-hogshead, and the plan, which is technically termed "sugaring," was first brought to its present state of perfection by the celebrated English entomologist, Doubleday. It has been found, however, that where willows, or ivy, or any other plant peculiarly attractive to the moths, happens to be in flower in the immediate vicinity, the "sugaring" process measurably fails. And in case any such moth-frequented flowers exist near the cotton fields, the cotton-planter who wishes to try the process recommended above must govern himself accordingly. In this, as in so many other instances, a knowledge of the peculiar habits of the insect, which we are attacking, will be found of great practical utility. The trapper and the hunter must study the habits of the wild animals which each is in pursuit of, before he can become a successful trapper or hunter. And just in the same way, before we can trap insects successfully, we must become acquainted with all the minutiæ of their mode of life.

At first sight it might be supposed, that the above method would be equally applicable to all night-flying moths, for example, to the Apple-worm Moth (*Carpocapsa pomonella*), the Handmaid Moth (*Datana ministra*), the Tent-caterpillar Moth (*Clisiocampa americana*), the Canker-worm Moth (*Anisopteryx vernata*), &c., &c. But English entomologists, who have been familiar for years with this system of "sugaring," tell us that it is almost exclusively the Owlet-moths (*Noctuæ*) that "come to sugar," as they phrase it. Now, the Cotton Moth, the Boll-worm Moth (*Heliothis armigera*), the Southern Grass Caterpillar (*Laphrygma macra*), our Northern Army-worm Moth (*Leucania unipuncta*), and the various species of Cut-worm Moths (*Agrotis* and *Hadena*), all belong to the Owlet-moths, and may consequently be expected "to come to sugar;" but most of our other noxious moths, including the four referred to above, belong to other families, and would, therefore, not be likely to be entrapped and slain in the manner recommended above. *Verb. sat. sap.* B. D. W.

Bag-worms *alias* **Basket-worms** *alias* **Drop-worms.**

(*Thyridopteryx ephemeræformis.*)

BY S. S. RATHVON, PENNA.

The following passage in the PRACTICAL ENTOMOLOGIST (Vol. II, p. 33) is very likely to lead the reader into a grave error, in regard to the sphere of operations of the insect named therein.

> For example, the "Basket-worms" that you speak of, which I suppose are the larvæ of *Thyridopteryx ephemeræformis*, otherwise known as "Bag-worms," never have been known, I believe, to attack any of the trees grown in our orchards for fruit.

My attention was first called to this insect upon an Apricot tree, in the summer of 1849, in the City of Lancaster, Pa. The tree stood alone in a yard, and was literally covered with them, and the crop of fruit rendered almost worthless, on account of the early deprivation of the leaves. From that period to the present, I have observed this insect in greater or smaller numbers every year, on the following trees:—Plum, Apple, Quince, Apricot, Cherry, Pear, Linden, Silver Maple, Red Cedar, Locust and Arbor Vitæ. On the Linden and Locust especially, I have found them in thousands, if not tens of thousands, stripping them almost entirely of their leaves. On fruit trees I have found them most abundant on the Apricot and Quince. In a small enclosure of my own, which contained an Apple, a Quince, a Plum and an Arbor Vitæ, they seemed to prefer the latter. I believe I have never seen them on the Peach, and but rarely on the Cherry, and then only in limited numbers.

On one occasion I had retained some of the cases or "follicles," inhabited by the wingless female of this species of moth, in my *sanctum*, where they were neglected for a few days. When my attention was directed to them again, I found that the eggs contained in them had hatched, and the young larvæ

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* I observe that Mr. Glover has hit upon this same idea. Speaking of this moth, he says:—"Could not some favorite aliment be found on which the moth prefers to feed, as in the case of the Tobacco-fly, and then poison them with some effective agent?" (*Monthly Rep. Agr. Dep.* 1866, p. 335.)

(which are then black) had each descended by its own silken cord, on some books and papers, on the wall, and on the floor, where they immediately commenced constructing their "habitacula" (or cases) out of the substances upon which they rested. Some were of leather, some of paper, some of scales of lime, (whitewash,) and others of the straw matting with which the floor was covered. On trees I have seen them appropriate the outer bark of the trunks and branches for the same purpose. With me, they hatched out from the egg state, from the 20th to the 28th of May; and their cases then stand up at right angles to the surface upon which they rest, and look like so many cone-shaped warts or spurs. And they carry them thus until they are from ten to fifteen days old, when they begin to suspend themselves from the underside of the leaves and branches.

Remarks by B. D. W.—The reader will be much obliged to Mr. Rathvon for the above correction. Common as this insect appears to be in Pennsylvania, I am not aware of its having been hitherto found in Illinois; and the assertion I made was based entirely upon statements found in books. Speaking of this same insect, Mr. Glover says:—"The drop-worm, as it is commonly called, is occasionally found upon the cotton-leaf, but generally infests the arbor-vitæ, larch, and hemlock-spruce. It is also found upon almost all of the deciduous trees, such as the linden and maple." (See *Monthly Rep. Agr. Dep.* 1866, p. 423, where a figure of the worm and of its singular case, constructed from pieces of leaves, will be found.) From the last Report of the Insect Committee of the Cincinnati Horticultural Society, it appears that 15 cases of this insect were recently collected in Ohio on cedar bushes, "a few in a place, or singly, one upon a bush." Hence it does not seem to be at all common there at present.

HABITS OF THE TREE-CRICKET.

(*Œcanthus niveus.*)

The annexed figures, which are copied from Harris, give a very good idea of the common Tree-cricket, the lower figure representing the male and the upper one the female. The general color is a delicate, greenish, semi-transparent white; but varieties occur in both sexes—and not exclusively in the female sex, as is erroneously stated by Harris, (*Inj. Ins.* p. 154)—with the legs and antennæ almost entirely black.

Miss Marion Hobart, of Port Byron, Ill., has ascertained that this insect deposits its eggs in the twigs of Sumac and Hazel, and has kindly furnished me with specimens. The eggs are yellow, cylindrical, but rounded a little at each end, about 0.13 inch long, and six times as long as wide, and strongly resemble those of the Catydid genus *Orchelimum*, as already described by myself. (*Proc.* &c. III, p. 232.) They are deposited in an irregular series nearly an inch long, lengthways of the twig, each egg sloping obliquely downwards towards the pith, and the series being indicated externally only by a slight brown roughness. A correspondent of Dr. Harris found this insect to lay eggs in peach twigs, but no details of the operation have been hitherto published. A European species is said "to make perforations in the tender stems of plants, and in each perforation to thrust two eggs quite to the pith." (Harris *Inj. Ins.*, pp. 154—5.)

The same lady, as has been already stated, (Practical Entomologist I, p. 126,) found this same insect to feed upon plant-lice during the summer of 1866. As her observations have been continued since, and as I believe them to be perfectly reliable, I subjoin what she says on the subject:

> I send you the identical insect that I found depositing its egg in the Sumac twig which I left with you. I kept it caged from October 13th to November 11th, giving it the best bill of fare that I could. There are two kinds of *Aphis*, one of which I find on the Pear-tree, [*Aphis mali*,] and the other on the tame grape-vine, [*Aphis vitis*,] that it never refused. I do not find any other kind that is quite to its taste; though, if I remember rightly, I found in the summer that a kind of *Aphis*, which occurs on the Oak, was acceptable to a specimen which I then had in confinement. It will eat apples quite readily, and once when it had had a long fast it nibbled a little dried oak-leaf, which it soon left for the eggs of a moth, (*Orgyia leucostigma.*) I have supplied it with a great variety of leaves since, but have never seen it eat any.

The Tree-cricket, therefore, like the Ground-cricket, appears to be rather a general feeder. But its peculiar taste for plant-lice is very remarkable and important. For the future, when these insects are noticed on trees infested by Plant-lice, instead of wantonly destroying them, we must say: "Well done, thou good and faithful servant. Eat your fill and do not spare the vermin. And even if you should occasionally nibble a piece of apple, we shall not grudge it to you, in consideration of your faithful services." B. D. W.

IMPORTING EUROPEAN PARASITES.

In the Compendium of the U. S. Census for 1860, (p. 82,) the New York State Agricultural Society is complimented very highly for its "philanthropic spirit," in having "introduced into this country from abroad certain parasites, which Providence has created to counterwork the destructive powers of depredatory insects." In support of this assertion, a passage, occupying a page and a half of fine type, is quoted from a Report by Dr. Fitch, the Entomologist of that Society; but this passage says not a single word bearing upon the above subject, except that "we have no parasites in this country that destroy the Wheat Midge." The real truth of the matter is, that the New York State Agricultural Society has done nothing of the kind, which the U. S. Census asserts that it has done; though, like certain other Societies, it has got the credit of actually doing a thing, because it has simply talked about doing it. Unless my memory fails me, Dr. Fitch stated in one of his Reports that he had written to that distinguished English Entomologist, Mr. Curtis, to send him living specimens of the parasites that infest the Wheat Midge in Europe, but that, as might have been naturally expected, no practical results followed from that application. How could it be otherwise? Who, in this dirty, selfish, mean little planet of ours—which, as Sterne has suggested, seems to have been made out of the refuse clippings from larger and better worlds—ever gives something for nothing? To set the matter in its true light, we may suppose Dr. Fitch's application, and the answer thereto, to have run somewhat as follows:—

DR. FITCH TO MR. CURTIS.—Imaginary letter.

My Dear Sir:—The State of New York is suffering an annual loss of many million dollars, by the fearful ravages of the Wheat Midge. Our State Agricultural Society is desirous of importing into the State some or all of the three parasites, which check and control that insect in your country, and prevent it from doing any material damage there. We wish for a very large number of living specimens of these parasites, so as to supply every one of the 59 counties in our State, and make it a moral certainty that the breed shall be permanently established in each. Of course, if the Society were to supply only one or two favored localities, it would give rise to a cry of partiality and favoritism, and would do us more harm than good.

Will you be kind enough to meet our wishes in this respect? I am well aware that your time is very fully occupied by scientific investigations, which will shed lustre upon your name to the remotest generation, and that what we ask of you will take up many months of your valuable time, and add nothing to your scientific reputation. I am well aware, also, that what we ask of you will probably cost you a few thousand dollars, to be paid out of your own private pocket. For example, as the Wheat Midge is comparatively quite rare in England, it would be necessary for you to run all over the country, in order to find some particular locality where it can be met with abundantly in company with its parasites; and having found that locality, you would have to establish yourself there for a few months, and go hard to work at collecting specimens. But as the work to be done can only be done, properly and effectually, by a man of distinguished Entomological attainments like yourself, and cannot safely be entrusted to a mere tyro in Entomology, I hope you will consent to assist us in the manner that we desire. Only conceive my mortification and disgust, if I were to be a party to the employment of some tyro for the object which we have in view, and that tyro, instead of sending us the Parasites of the Wheat Midge, were to send us some new Noxious Insect, in addition to the hundreds, which we have already imported accidentally from Europe, and which annually pick the pockets of our Farmers of hundreds of millions of dollars! Think, my dear sir, for one moment, of our Midge-ridden farmers in New York! Think that, by sacrificing a few months of your time, and a few thousand dollars out of your own private pockets, you will put millions of dollars into the pockets of our wealthy State, and, eventually, hundreds of millions into the pockets of the whole United States! With your well-known philanthropic sentiments, can you possibly, for one single moment, resist the temptation of making the American people more rich and more prosperous than they already are?

You will please distinctly to understand, that neither the Congress of the United States, nor the Legislature of the State of New York, nor the New York State Agricultural Society, have appropriated one cent towards the furtherance of the above very important subject. It is possible, therefore, that, in addition to your own personal expenses, you may have to pay, out of your own pocket, the freight and express charges on the packages of living Parasites sent from time to time to us. But even if you have to do this, think of the glory you will acquire by annually, for all time, adding hundreds of millions of dollars to the profits of the great American nation!

Very respectfully, yours, &c., &c., &c.

MR. CURTIS TO DR. FITCH.—Imaginary answer to the above.

My Dear Sir:—Very much obliged for your kind offer, but, as the old saying goes, "Charity begins at home." Please to accept the expression of my very distinguished consideration, &c., &c., &c.

Very respectfully, yours, &c., &c., &c.

ANSWERS TO CORRESPONDENTS.

L. D. Morse, Me.—The two larvæ about ¼ inch long, which, as you say, "were found in Texas-grown Osage Orange seed, and are called by the Texans the Screw-worm," are quite new to me, and, so far as I can see from their pressed and flattened condition, different from anything known to me. Please, if possible, send me several dozen living specimens, packed in a little pasteboard or tin box, that I may see the actual creature and not its squashed carcase. If this larva feeds upon Osage Orange seed, as I infer from what you say, it cannot be the same "Screw-worm," which, according to the item clipped from the Texan Newspaper, hatched out in the fly-blown nose of a sleeping man, "and penetrated the head so as to cause his death." As the item goes on to say that "this is the first *human* death we have ever seen recorded from that cause," I rather infer that the true Texan "Screw-worm" attacks stock in some manner or other, and that the specimens which you send, if they really do feed on seeds, are something quite different. It is impossible that any larva should sometimes feed on the body of a living animal, and sometimes on vegetable substances.

Thos. T. Smith, Minn.—The robust green worms, as big as a man's thumb, and with singular coral-red, yellow and blue warts growing on their backs, which you found feeding on wild plum leaves, are the larvæ of the *Cecropia* moth (*Attacus Cecropia*). Besides plum leaves, they feed on apple, cherry, currant, barberry and hazel leaves, and I have this summer found them actually eating hickory leaves. In a state of nature the larva attaches its tough, pale-brown, pod-like, silken cocoon to the side of a twig, and there it remains all winter exposed to the bitterest blasts of heaven. Yet next May or June the chrysalis, into which the larva changed shortly after spinning up, scarcely ever fails to work its way out into the light of day in the winged moth form. This feat is gradually accomplished by the chrysalis rubbing its rough head from side to side against the upper end of the cocoon, where the silk is less dense; and the whole process—which has been performed under my own personal inspection—occupies about an hour, during all which time you can hear the persevering little animal rub-rub-rubbing for dear life. Of course, if the moth first came out of the pupal shell, and afterwards undertook to rub a passage-way for itself, it would wear all the beautiful downy hair off its forehead. In the writings of many closet-naturalists, you will find a great deal of nonsense about moths discharging an acrid fluid, which burns a passage-way for them through the cocoon. They do, in reality, almost all of them discharge a creamy fluid, either shortly before or shortly after emerging from their cocoons; but that fluid, which I have repeatedly daubed over my own flesh, has no "acrid" or "burning" properties whatever; and moreover it is discharged from the tail of the moth and not from its head, so that, unless the moths emerged tail-foremost (which is never the case), it could not help them to escape, even if it was as strong as aqua-fortis.

The *Cecropia* moth is, to my taste, the handsomest, as it is certainly one of the largest insects found in the U. States, expanding about six inches from wing-tip to wing-tip, and being of a rabbit-gray color with a large kidney-shaped eye in the middle of each one of its wings. Of the two specimens sent, one had died in the larva state, probably from not having been fully fed, and the other had changed into the chrysalis state and was alive and healthy. You will find an excellent figure of the moth in Harris's *Injurious Insects* (p. 387), but that of the larva (p. 388) is too elongate, having evidently been drawn from an alcoholic specimen.

Willie C. Fish, Mass.—Many thanks for the Apple-worm specimens, which arrived in good order. All you sent were in the pupa state when they reached me, and all belonged to the same species, those in the tin box merely differing in being pale immature individuals. They are identical with specimens previously received by me from Connecticut, and having the same habits as your insect. The insect is as yet undescribed in this country, though I suspect it to be an imported species, from the fact of its occurring only on the Eastern seabord. Fitch's Apple Midge (*Sciara* [*molobrus*] *mali*) is quite different, as that belongs to the Mycetophila Family (Nemocerous Diptera), and is expressly described as having in the pupa state distinct wing-cases and leg-cases, like all the other species of that group; whereas this species has none at all, being what is technically termed a "coarctate" pupa, or, in other words, the true pupa being enclosed in the shrunken skin of the larva so as to hide its limbs. I hope to breed this insect to the perfect state in the coming summer: and as I shall then be better able to complete its history, I will defer till that time making use of the valuable information, with which you now furnish me respecting its habits.

As to the larva spoken of by Mr. Calvin Ward, as infesting his apples in Vermont, (PRACTICAL ENTOMOLOGIST II, p. 20,) either he is in error in describing it as "the size of a common pin in diameter and almost ¼ inch long," or it must be a distinct species from yours. The larva of your species, as received by me from Connecticut, is about 0.15 inch long and 4½ times as long as wide. Perhaps Mr. Ward described his larva from memory only, and not from actual measurement; in which case mistakes are very apt to occur, even with good entomologists.

C. Moran, Ky.—If you could send me specimens of your diseased grapes, I could say, with some degree of certainty, what ailed them. At present I can only guess and grope round in the dark. You assume that it was "a bug or beetle that destroyed your grape crop last summer," and yet you acknowledge that you "are entirely ignorant of the habits or even of the appearance" of this supposed insect. If it really was an insect that punctured your grapes, as the common Curculio punctures a plum, it is an entirely new fact. No insect is known to infest the grape in this manner, in the Northern States, though very possibly some such insect may occur in the South.

But I suspect that what ailed your grapes was the common "Rot," as distinct from "Mildew," which last is sometimes incorrectly called "Rot." "Mildew" usually appears at first in the form of white cottony patches on the lower surface of the leaves, and finally attacks the berries *when they are no bigger than peas*, causing them to shrivel up and never grow any larger. The true "Rot," on the contrary, according to Dr. Engelmann, "makes its appearance *only on nearly full-grown berries*, exhibiting in the first stage a discolored spot on the side of the berry, about ⅛ inch in diameter, with *a dark dot* in the centre; after which the berry gradually shrivels up and turns black." (See *Report of the Agricultural Department*, 1865, p. 332.) Let us see how this agrees with your statement of facts. "This season," you say, "I had ten thousand vines in vigorous bearing, and they set a fair crop with some Rot [Mildew?] in the early part of the season. *About the time the grape had nearly attained its usual size*, I noticed that the berries were all stung or punctured, each of them bearing *a small black speck*, and by the time they should have ripened there was not a handful of them on the vines, but the ground under the vines was filled with them. I learn from other cultivators, that a number of other vineyards in the State suffered in the same manner."

"Mildew" and "Rot" are each of them produced by a distinct microscopic Fungus, similar to the "Oidium" which some years ago played such havoc in the European vineyards; and, as in the case of the "Oidium," the most approved remedy is dusting the vines from time to time with sulphur. If, on the other hand, it should be some unknown insect that is preying on your grapes, I can indicate no remedy until I find out who and what the culprit is; and to do this I must have fresh specimens of the infested fruit to experiment on. Next season you may probably be able to supply me, in case you conclude that it is not the "Rot" that is troubling you. In any event, let me know the results which you arrive at.

Wm. Muir, Missouri.—The white conical galls, ¼ inch long, and about thrice as long as wide, with a few blood-red thorns scattered round the basal part of each, which you say were "found on the leaves of young oaks," are produced by an undescribed species of Gall-fly (*Cynips*)—the same genus which makes the well-known "Oak-apples" on the Black Oak (Quercus tinctoria.) Both the gall and the fly contained therein are closely allied to the *Cynips tubicola* of Osten Sacken, but still are quite distinct. That gall occurred on the Post Oak (Quercus obtusiloba), in clusters on the underside of the leaf. I should be glad to learn on what species of Oak yours grew, and whether it grew in clusters on the lower surface of the leaf like its ally. As the insect producing this Oak-leaf gall belongs to the Order Hymenoptera, and that which produces the leaf-galls on the Clinton grape-vine to the Order Homoptera, of course the occurrence of the two galls on the same spot of ground was merely accidental.

The larvæ found in ash cord-wood, and supposed to be those of a Borer, are the larvæ of some species of Digger Wasp, which had made its nest there. The cocoons are too much broken to say with any certainty to what genus of Wasps they belong. None of the boring beetles make any cocoon at all; and the larvæ of Boring Moths—the Peach and Currant Borers for example— are quite different from yours, and make a very different cocoon. In a future paper, I propose to explain the natural history of our Wasps, and will, therefore, drop the subject for the present.

M. S. Hill, Ohio.—The Cicadas ("Locusts") which you now send, belong to the same species sent before—namely, the common seventeen-year Cicada (*C. septendecim*)—only they are more mature and highly colored. Similar variations occur in many species of insects. As to the difference in the song of the two, which you noticed, that was probably caused by the "drum" of the male not being as yet fully matured and hardened. Young male singing birds make similar imperfect attempts, when they first begin, as bird-fanciers call it, to "record." I must confess, however, that I do not at present recollect any analogous case among insects.

The "small whitish-green worms, about ⅛ inch long," which you describe as eating their way backwards from the edge of the leaf of the Grape-vine, "in rows of fifty to a hundred," must either have been very young individuals of *Procris americana*, (See PRACTICAL ENTOMOLOGIST I, p. 10,) or some species unknown to me. The larva of that moth grows to be over ½ inch long; but possibly you may only have noticed your larvæ when very young, as you say that their numbers were not "sufficiently large to injure the vines to any great extent."

W. H. S., Illinois.—The shining black beetles, with four reddish spots on their wing-cases, and not quite ¼ inch long, are the *Ips 4-signatus* of Say, with a single specimen among them of the closely-allied *Ips fasciatus* of Olivier. You say that they "eat into apples and pears, apparently burrowing into holes made by some other insect or by a bird," and that you "have found 10 or 12 in one hole in a single apple." Many years ago I received specimens of the *4-signatus* from Minnesota, with a statement that they burrowed extensively into sweet corn. I forwarded some of your specimens to Dr. Houghton of Philadelphia, and he replies that they do not resemble the "click-beetles" which attack his fruit in a similar manner, being less than half as long and broad, and differing otherwise. The genus *Ips* belongs to the *Nitidula* family of Beetles, which also includes the *Nitidula bipustulata*—a small, oval, dingy-black insect, with two red spots on its back—often found in great numbers preying on old cheese and sometimes on bacon.

F. T. Pember, N. Y.—The supposed *Iulus*, which you say that you have "often seen feeding on turnips, both before and after they were removed from the ground," is probably the *Polydesmus complanatus* spoken of by Dr. Fitch, as destroying the roots of young cabbages, onions, &c. (See PRACTICAL ENTOMOLOGIST II, p. 35.) It differs from true *Iulus* in the body being "flattened," just as you describe it, instead of perfectly cylindrical, and in having no perceptible eyes, whereas every species of *Iulus* has two very distinct eyes. You say yourself that it has only "something like 20 pairs of legs," whereas *Iulus* has usually almost a hundred pairs, the number increasing as the animal grows older. I shall be glad to receive the promised specimens.

Milton Conrad, Penna.—The facts you mention about the "gapes" in chickens being caused by a worm burrowing in the lungs, are very curious, and, I believe, new. If you can send me a specimen, I can tell at once whether it is the larva of some insect, or whether it is an intestinal worm belonging to the same Class—Entozoa—as the Tape-worm, &c., and never changing into a winged insect. Preserve it, if convenient, in a vial with alcohol, or else enclose it in a quill, tightly corked at each end, without suffering it to dry up, and adding a little alcohol before the second cork is put in.

C. P. Wickersham, Penna.—What I said in the passage to which you refer (Practical Entomologist I, p. 101) was that "both Harris and Fitch ignored the possibility of any larvæ [of the Wheat Midge] passing *to the pupa state* in the ear, and *coming out as winged flies the same season.*" The passages you quote from Harris in no wise controvert this assertion, as they only refer to the *larva state* of the insect. As to the knotty question, whether the filmy membrane enveloping the full-fed larva of the Wheat Midge be its moulted skin or a true cocoon, I must again refer you to the passage in my Willow-gall Paper. (*Proceedings* III, pp. 560—9.) You will find that I there show, that in certain species of *Cecidomyia* beyond all doubt, and as I maintain in all species without exception, the envelop in question is not spun like the cocoon of a silkworm, nor moulted off from the body of the insect, but secreted in a gummy form from the general surface of the body, just as many Plant-lice and Bark-lice secrete a cottony or sugary substance from the general surface of their bodies. This theory disposes of your objection, that "under a high magnifying power there is no trace of any fibre in the so-called cocoon, while on the other hand there are traces of the rings of the body of the larva." Whether a pupal envelop formed in this manner is properly called a "cocoon," is a mere question of words and not at all a question of facts. But this whole subject is rather an extensive and recondite one, and I must refer you once more, if you wish to learn my views more fully, to the Paper quoted above, and to the concluding part of that Paper which is now in press.

Rich. Middleton, Penna.—In answer to your three questions, 1st. Frogs and toads are generally not only harmless but beneficial, as they chiefly live upon insects. Toads, however, will eat strawberries; but otherwise they are very useful in a garden. Frogs have the power of leaping; toads have not. 2nd. All spiders feed upon animal food and chiefly upon insects. So far as they feed upon noxious insects, they are eminently beneficial. 3rd. You need not be afraid to handle any insects, except Wasps and Bees, and even with these it is only the females that sting. It is true that there are a few hairy caterpillars, the hairs of which will sting the back of the hand, or any other part where the skin is thin, about as badly as, and no worse than, a nettle does. But if the palms of your hands are as hard and horny as mine are, you may handle even these with perfect impunity, as I constantly do. Again, there are a great number of insects that will try to bite, when roughly handled; but no such species known to me can do more than just pinch a little, without penetrating the skin or inflicting any wound. Moreover, there is a group of large, two-winged cannibal flies, (*Asilus* family,) which fly with a loud, buzzing noise among herbage, and prey upon such large insects as Humble-bees and grasshoppers; and there are also the Water-boatmen (*Notonecta* family) found exclusively in water; both of which two groups will often puncture you with their beaks, if you let them. There are a few *Ichneumon* flies, too—particularly a large black species known as *Ophion morio*—the females of which will often penetrate the skin a short distance with their ovipositor, when roughly handled. But all this is no worse than the prick of a pin, as—unlike the female Bees and Wasps—none of these insects have any poison-bag attached to the instrument that penetrates your flesh.

M. M. S., Penna.—The minute white scales on the under surface of the leaves of your Olea fragrans, are a species of Bark-louse, otherwise called Scale-insect, which I have not hitherto met with. If you raise one of the scales at this time of the year with the point of a penknife, you will find underneath it a roundish yellow louse, often accompanied by some of the minute elongate-oval eggs which it has laid, and from which next spring there will hatch out a fresh brood of young Bark-lice. Under a single scale I was fortunate enough to find one of the males, which, as is usual in this family, had two long wings, the females being always wingless to the last moment of their existence. In this particular species, the "Scale" is not formed of the lifeless body of the female—as is the case with the common Apple-tree Bark-louse*—but is a distinct integument, constructed by the female to protect herself and her eggs, and probably secreted from the general surface of her body. There is a very much larger Bark-louse which I have noticed to infest the leaves of the Oleander; and some few years ago the Orange trees in Florida were almost entirely destroyed by another species, which infests that plant in Europe, and which had been accidentally imported on a single small mandarin orange-tree, and spread therefrom on to an adjoining orange-grove. In fact, the number of distinct species of Bark-lice, as of Plant-lice, is very large, each species, as a general rule, confining itself to a particular group of plants, and often to a single species of plants. But, from the general distaste for these insects, but few observations have been made in N. A. upon their history. Scientifically speaking, the Bark-lice belong to the *Coccus* family in the Order *Homoptera*. Disagreeable as many of them are, we are indebted to one species for our Shellac, and to another for our Cochineal.

In order to destroy these insects, you had better wait till the eggs hatch out in the spring, and then wash or syringe the whole of the infested plants with moderately strong lye. As lye when it is too strong is injurious to plants, it would be a good plan, after you have prepared it, to try it upon some plant that you care nothing about, by way of experimenting; and you can then, if necessary, reduce its strength. Your plants will lose nothing by your waiting till spring, as the old mother-lice are about giving up the ghost after depositing their quantum of eggs, and even the younger individuals will remain torpid under the protecting scale until the warm weather comes. If you prefer it, you will find tobacco smoke in a small close apartment fully as effectual as the lye.

The little green parasites on your rose-bushes are doubtless the Rose Plant-louse (*Aphis rosæ.*) The "tiny, little, white creatures, like moths, upon your plants," judging from your drawing, must have been a species of *Psychoda*, a genus of Two-winged Flies allied to the Gall-gnats, and in no wise injurious to plants; or perhaps a species of *Aleurodes*, a genus closely allied to the Plant-lice and with the same habits, one species of which I know to infest the Crab and the Apple-tree in small numbers.

You will greatly oblige me by mailing me a dozen or so of these infested leaves, packed as soon as gathered, in any little tight tin box. The specimens sent, as well as the insects upon them, were completely dried up, when they reached me.

Willie C. Fish, Mass.—Your insects are, 1st. *Hylastes pinifex* Fitch, dark variety. 2nd. *Tetraopes canteriator* Drap. 3rd. *Colaspis ovata* Say. 4th. *Cryptocephalus*, not determined. 5th. *Hippodamia parenthesis* Say. 6th. *Psyllobora 20-maculata* Say.—*Haltica chalybea* is quite different from No. 3, being more elongate, less globose, and having thickened hind thighs.

S. P. Monks, N. Y.—1st. The hundred-legged worm which you send, and which you state to have been found "in a rather damp place where there is much decayed wood," does not belong to the genus *Iulus*, which has its body almost as smoothly cylindrical as a goose-quill. I have forwarded the specimen to Dr. H. C. Wood of Philadelphia, who makes the *Myriapoda* his special study, and has published a valuable Paper on the subject, and he has obligingly informed me that it is *Polydesmus virginiensis*, Say. I have never met with the species in Illinois. Among the *Myriapoda* (thousand-legged worms), there are no distinct stages corresponding to the larva and pupa state of Insects, the more mature scarcely differing from the less mature worms, except by having a greater number of joints to their bodies. 2nd. The brown-black newts with orange-colored spots, that you speak of, so far as my observation extends, feed upon insects, &c. I usually find them under logs and stones in the woods, but twice I have found them in water. 3rd. I know of no work on Entomology exactly suited to be put into the hands of children. Harris's book is the nearest approach to what you inquire for. Some day or other I may write such a work myself.

Geo. Haines, N. J.—The flat-oval gray eggs about 3-16ths inch long, and glued in two regular rows to the side of a grape-twig, are, as you correctly suppose, those of a Catydid.

Geo. W. Smith, Michigan.—In a future article on Wasps and their habits, I will explain the phenomena which you witnessed. The wasp was no doubt the common blue species, known to entomologists as *Sphex cærulea*.

C. V. Riley, Ill.—The *Scolytus* you send, which you say is "very destructive in this country," though you do not specify the particular tree or trees which it infests, is apparently identical with an undescribed species, of which I dug several dead specimens out of a Hickory rail years ago. Most certainly it is not the *Scolytus destructor* (Olivier) of Europe, which preys exclusively on the Elm, nor the *Scolytus Ratzeburgii* (Janson) of Europe, which preys exclusively on the Birch, and has been confounded with *destructor* by many authors. I have another undescribed N. A. species, of which I obtained many specimens in South Illinois, from what I believe was a beech. For convenience' sake, I shall call this last species *fagi* and yours *caryæ*, and proceed to distinguish the above-named two European and our four North American species in the following manner:—

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* Figured Practical Entomologist II, p. 31.

A. Color chestnut-brown. Elytral interstices with more than a single row of punctures. (Venter finely, deeply and closely punctate; 3rd and 4th ventral joints ♂ ♀ with a minute tooth on their anterior margin.)
Scolytus destructor (Europe.)

B. Color black. Elytral interstices with a single row of punctures.

- *a.* Venter very sparingly and rather obscurely punctate. (Elytral interstices with a single somewhat disorderly row of very minute punctures. The ♂ with a tubercle on the anterior margin of the 3rd ventral joint, and the anterior margin of the 4th joint acutely produced, reflexed and emarginate; the ♀ with the ventral joints entire.)
  Scolytus Ratzeburgii (Europe.)
- *b.* Venter closely and very distinctly punctate.
  1. Elytral interstices each with a row of minute widely distant punctures, so as to appear polished instead of sub-opaque. (Head finely rugoso-punctate. Posterior tibiæ simple. Ventral joints ♂ ♀ entire.)...**Scolytus fagi**, n. sp. (N. A.)
  2. Elytral interstices sub-opaque, and each with a row of largish confluent punctures, so as to be almost punctato-striate, but much less coarsely and deeply so than in the case of the normal striæ. (Head longitudinally aciculate. Posterior tibiæ simple. Ventral joints ♂ ....? ♀ entire.)......**Scolytus caryæ**, n. sp. (N. A.)
  3. Elytral interstices punctato-striate so as to be confounded with the normal striæ of the elytra. (Head longitudinally aciculate. Posterior tibiæ with long hairs behind. Ventral joints ♀ [and ♂?] entire.)...**Scolytus muticus** Say. (N. A.)

C. Color black, with reddish-brown elytra. Elytral interstices with a single row of obsolete punctures. (Head longitudinally aciculate. The 3rd ventral joint ♂ [and ♀?] with three spines, 4th joint with a single smaller spine.)........................**Scolytus 4-spinosus** Say. (N. A.)

The male of *fagi*, n. sp., is distinguishable from the female by the front being widely and deeply excavated. All that I have seen of *caryæ*, n. sp. seem to be females. *Scolytus pyri* (Peck), which infests the pear-tree, and has been erroneously supposed by many eastern authors to be the cause of the well-known "fire-blight," is not a *Scolytus* but, according to Harris, a *Tomicus*. (*Inj. Ins.* p. 91.) *Fagi* has been circumscribed from 6 specimens; *caryæ* from 4, including that now sent to me. For the characters of the two European species I am indebted to Janson, (Stainton *Ent. Ann.*, 1856, pp. 87—9,) and for those of Say's two species to Say's own descriptions. As I am not acquainted with either of these last, I may possibly have misunderstood the description of the elytral striæ in *muticus*. Unfortunately Say does not state upon what tree or trees either of his two species occurred. But from the analogy of the other four species, and of the European *Scolytus hæmorrhous* which attacks the Plum-tree, and the European *Scolytus pygmæus* which attacks the Oak, I should infer that each of them inhabits some peculiar species or genus of trees, being what I have elsewhere called "Phytophagic species."

To prevent confusion it may be well to say here, that the insect known in England as *Scolytus destructor* is often designated on the continent of Europe as *Eccoptogaster scolytus*. But Janson has shown in the passage above referred to, that the generic name *Scolytus* (A. D. 1764) has priority over *Eccoptogaster* (A. D. 1793), although the specific name *scolytus* (A. D. 1792) has priority over *destructor* (A. D. 1795.) As, however, we can scarcely call the insect *Scolytus scolytus*, we must violate here the strict law of priority and call it *Scolytus destructor*.

(Since the above was written, Mr. Riley has informed me that his species, which he has described in the *Prairie Farmer*, Feb. 2, 1867, under the name of *Scolytus caryæ*, infests the Hickory, just as I anticipated. The proper designation of this insect will be *Scolytus caryæ*, Riley.)

D. F. C., Ill.—The minute 4-winged insects, about 1-16th of an inch long, and with their wings of a dull milk-white color, are an undescribed species of *Aleurodes*. You found them on apple leaves; several years ago I found precisely the same species on the leaves of the wild crab. The genus gives its name to a family, which is closely allied to the Plant-lice and the Bark-lice, and consequently belongs to the Order Homoptera; and, as is so often the case in these last two families, each species is confined to a particular genus of plants and can live upon no other. In supposing that this minute Bug was a minute Moth, you are in very good company. Linnæus, Reaumur and Geoffroy made precisely the same mistake.

This insect cannot be the cause of Fireblight, because it is quite scarce and Fireblight quite common. The minute larva, which is shaped much like a female bark-louse, does not live in the bark, but on the under surface of the leaves, sucking the sap therefrom like a Plant-louse.

Isaac Hicks, N. Y.—The pupæ of Dr. Trimble's Apple-maggot reached me in good order, and are precisely identical with those previously received from Connecticut and Massachusetts. I hope to use the information you give me upon this subject in a future Paper.—I am quite unacquainted with the Bark-louse of the Tulip-tree, and shall be very glad to receive specimens of it. The "swarms of a new kind of fly, that made a noise like a swarm of bees" round the Tulip-tree that had been almost killed by these Bark-lice, were perhaps attracted there by the sap issuing from the minute punctures made by the Bark-lice. I once saw Hornets and other kinds of Wasps swarming in the same manner round a Black Oak, that had been badly bored up by a Sapsucker, and many of them settled upon the holes made by the Bird, and evidently drinking up the sap that oozed therefrom.—Many thanks for the facts you furnish about Birds and Insects, which I shall take a future opportunity to use.

The Critic criticized.

In the *Prairie Farmer* of Jan. 19, 1867, there appears a criticism of "the Report of the Entomologist in the Annual Agricultural Report, 1865," accusing the aforesaid Entomologist of "calling the perfect insect of the apple-tree Borer, *Saperda bivittata*, a *butterfly* on page 205." Now, in the first place, the article, of which page 205 forms a part, is not written by the Entomologist, Mr. Glover, but by Mr. Wm. C. Lodge, of Delaware; and in the second place the writer, in the passage referred to, expressly calls the insect in question, not a butterfly, but a "beetle," He says, indeed, and says truly, that this beetle "flies about at night," but that is not calling it a "butterfly" nor even a moth.
B. D. W.

OBITUARY.

DIED, of Typhoid Fever, on January 11th, 1867, DR. BRACKENRIDGE CLEMENS, of Easton, Penna. It was only the middle of December when he was at the Hall of the Entomological Society, in Philadelphia, looking as hale and hearty as ever. He was an excellent entomologist, with good, sound, general views, and had devoted his especial attention to the Lepidoptera (moths) of this country. Readers of the *Practical Entomologist* will recall his name as having been more than once quoted as authority in the "Answers to Correspondents." Peace to his ashes!

NOTICES.

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Contents of first number (March, 1867).

Introductory.
The Land Snails of New England, (*with a plate.*)
The Volcano of Kilauea, Hawaiian Islands, in 1864—5, (*with a plate.*)
The Fossil Reptiles of New Jersey.
The American Silk Worm, (*with illustrations.*)
Winter Notes of an Ornithologist.
Reports of the Meetings of Scientific Societies.
Natural History Miscellany.
Reviews.
Natural History Calendar.
Answers to Correspondents.
Glossary for the Number.

☞ Prospectus sent on application to the Editors.

THE
Practical Entomologist.

A MONTHLY BULLETIN,

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The Practical Entomologist.

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PHILADELPHIA, MARCH, 1867.

☞ CHANGE OF NAME. ☜

At a meeting of the Entomological Society of Philadelphia, held March 11, 1867, the following By-Law was unanimously adopted:—

> "Article 1, Chapter 1.—The Society shall be called the AMERICAN ENTOMOLOGICAL SOCIETY, and is instituted for the improvement and advancement of Entomological Science, and the investigation of the character and habits of Insects."

The above change has been made for two reasons. 1st. That the Society has to rely on the country at large for support, and in order to receive this support, the erroneous idea which is in many minds, namely, that the Society is a *local* institution, must be displaced. 2nd. It is believed that this change in the name will extend the reputation and claims of the Society, and awaken new and more extended exertions for the permanent support of the only Entomological Society in the United States.

Now that the Society has adopted a national name, it is hoped that ALL the readers of the *Practical Entomologist* who recognize the usefulness of an Entomological Society, will rally to its support. Any one may become a CONTRIBUTING MEMBER by the *annual* payment of a sum of not less than *One dollar*. The Society will furnish each member with a handsome diploma. Let all who are in favor of the diffusion of useful knowledge become Contributing Members of the AMERICAN ENTOMOLOGICAL SOCIETY.

WIRE-WORMS.

The ancient Romans had a proverb—"It is garlic that I am talking about, and you answer me about onions." (*Ego de alio loquor; tu de cæpe respondes.*) Americans, when they are talking about insects, sometimes in the same way answer one another at cross-purposes. For example, there are two entirely distinct creatures known by the name of "Wire-worms" in America. The first of these is not a true insect, but a Thousand-legged worm, belonging to the genus *Iulus* and the class *Myriapoda*.* A figure of one of these is repeated here from PRACTICAL ENTOMOLOGIST, II, p. 34, that the reader may see at once, that it has a very large number of joints to its body, and nearly four times as many legs as it has joints; and this kind of so called Wire-worm, never changes into anything materially different from itself. On the other hand, the second of the two above referred to, is a true insect, but still in the larva or imperfect state; and, as will be seen from the annexed figure, it has only twelve joints to its body, exclusive of its head, and only six legs, which are placed two upon each of the three front joints of its body. Moreover it has no conspicuous antennæ on its head, whereas the other one has antennæ of some considerable length. This second kind of "Wire-worm"—which is the one that is properly so designated, both in Europe and America,—changes after the lapse of several years to what is popularly known as a "Click-beetle," (*Elater* family.) That from which the

Color, livid brown.

Color, pale shining mahogony.

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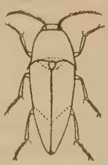
* Harris states that *Iulus* is the American "wire-worm," *Inj. Ins.* p. 52.

above figure was drawn was quite large when I obtained it, and after remaining two entire years in my Breeding-jar, changed into the Click-beetle, represented in the margin and scientifically known as the *Ludius attenuatus* of Say. Like most of the larvæ of our click-beetles, this one fed upon decayed wood; but there are several species which feed underground upon living roots, one in particular which infests young corn in the hill, especially in newly-broken land; and as these come more particularly under the notice of the Farmer and the Gardener, it is to these that the name of "Wire-worm" more usually refers, unless indeed it should be the bogus Wire-worm, (or *Iulus*) that is spoken of. Of the perfect Click-beetles we have several hundred distinct species found within the limits of the United States, and in the single State of Illinois I have myself met with about a hundred. But very few of them are known in the larva state, owing to the great length of time required to breed the larva to maturity.


Color, pitchy black.

In the *Country Gentleman* of Dec. 13, 1866, I find the following observations from a New York correspondent, who is evidently talking about the bogus Wire-worm (*Iulus*), and replying to another correspondent from New Hampshire, who has been talking about the true Wire-worm. This is quite plain from the fact, that the former speaks of his so-called "Wire-worms" laying large numbers of eggs; which the true Wire-worms never can do, that office being reserved for the fully matured Click-beetle.

> The wire-worm is an oviparous insect, like the ant. He excavates cells like the ant in the hard subsoil, some eight or ten inches under the surface of the earth, and in those cells deposits his eggs, very much resembling ants' eggs, and the sun hatches them out. This they do from the commencement of warm weather in spring until the cold in the autumn. This is proved by plowing, when a careful observer will discover worms of all sizes, from the large, fully developed insect, to the smaller ones of all sizes, down to worms not over one-eighth of an inch long. I have also found the eggs. Now, it may be asked, what of all that? I answer that deep plowing, and using the subsoil plow, will disturb those egg cells and prevent their hatching out, by scattering them about on the surface. I think one thing is certain—there is no way to destroy the worm but with the plow. Frequent plowing, and *late plowing*, cannot fail to be found the most effectual way to get rid of the insect, particularly in *frosty days*, when, as soon as the worms are exposed, they are stiffened by the cold and frozen hard during the ensuing night. This I am certain of, for I have tried it, and after plowing, have found them dead on the surface, and seen them blown by the wind on the snow to some distance in winter.
>
> By the way I cannot agree with your New Hampshire correspondent, that the wire-worm turns into a snapping-bug. I have been here in the midst of them for three years and over, and during all that time have never seen a snapping-bug. I think your correspondent has fallen into an error.

Yes, sir, you are quite correct; your so-called Wire-worm never does or can change into a "Snapping-bug," or Click-beetle" as others call it. But the true Wire-worm of the correspondent from New Hampshire does so change. The difference between you two correspondents, is merely a difference in *words*, and not in *things*. You are designating entirely different creatures by the same popular name, and hence naturally arises confusion, misconception and error. One of you is talking of garlic and the other of onions; one is disputing about chalk and the other about cheese; one has a thousand-legged worm in his mind's eye and the other the larva of a Click-beetle. Those who ridicule the use of scientific terms, as disagreeable and unnecessary, should ponder well into what sloughs of mystification the use of popular names, unaccompanied by the corresponding scientific names, will sometimes lead us.

As to the assertion of the gentleman from New York, that, during a period of three years, he had "never seen a Snapping-bug" in the fields where his so-called Wire-worms were found, all I can say is, that Click-beetles must be very scarce in the State of New York. In Illinois I do not think that I ever collected for a few hours, without meeting with scores and often hundreds of specimens, of some species or other of the great Elater family.

B. D. W.

CEDAR APPLES.

These are smooth, roundish, pale reddish brown bodies, about ½ or ¾ inch in diameter, and attached by a very short stem to the twigs of the Red Cedar. They were mistaken for Galls by Dr. Fitch, and supposed to be produced by Gall-flies. (*New York Reports*, II. § 285.) In reality they are Epiphytous Funguses (or Mushrooms), growing upon the twigs of the Red Cedar, as many Lichens and Mosses grow on the trunk and the main limbs of a variety of trees. They commence their growth very early in the season, and by the forepart of April they have nearly attained their full size in the latitude of Rock Island, Ill. At this time and for more than a month afterwards, they are whitish and fleshy inside; whereas the old last year's specimens, which still hang on the trees, are rust-red inside and of a hard, dry, spongy texture. Between the middle of April and the latter part of May, there put forth from the surface of these new Cedar Apples, many filaments, about ¼ inch long and 7 or 8 times as long as wide, bearing on their surface a quantity of a fine rust-red powder, which consists of the "spores" or seeds of the fungus.

As these Funguses are often so abundant as to be very injurious to the Cedar, it is well to know how we may easily get rid of them. All that is required is, early in April to cut off and destroy the young growing "apples" before the "spores" or seeds commence to develop themselves. The old, dead, dry "apples," may, of course, be allowed to hang on the twigs, as they have long ago shed their seed. By persevering in this system for a year or two, or perhaps even for one year only, these unsightly excrescences may be subdued. But it is not improbable that some of the spores may remain in the crevices of the twigs for over one season, before they finally vegetate, just as the seeds of some weeds lie in the ground several years before they start to grow.

B. D. W.

BLACK-KNOT.

In the first volume of the PRACTICAL ENTOMOLOGIST, pp. 48—51, I showed that Black-knot is nothing but an assemblage of minute funguses, which perfect their seed, or "spores" as Botanists term it, the latter end of July; and that consequently, as this fungus is an annual plant, by cutting off and destroying the Black-knot early in July its further propagation may be effectually stopped.

My observations and experiments referred exclusively to the Black-knot on the Wild Plum, (Prunus americana.) But from the evidence which will be adduced below, it appears to follow as a necessary consequence, that the Black-knot on the Cherry is caused by a distinct species of fungus from that on the Plum. It is possible therefore, that the period at which the Cherry fungus matures its seed, may differ somewhat from that at which the Plum fungus matures its seed; and in that event the proper period for cutting off and destroying it, must also differ more or less.

The following appeared in the *N. Y. Sem. Tribune* of Feb. 2, 1866, from the pen of Mr. Jas. H. Parsons, of Franklin, N. Y.

> "Are the black-knots which infest the plum and the cherry-trees the same in kind? Thirty years ago we had a number of large and thrifty plum-trees, which bore an abundance of fruit every year. When the black-knot appeared, the plum-trees rapidly disappeared. We then set out cherry-trees which thrived for a dozen years or more, when the black-knot attacked them also, and this year, for the first time, they yielded no fruit, and may be considered dead, as the black-knots upon the few that yet remain are more numerous than the leaves were the last summer. In the meantime several plum-trees have started up, and more are appearing every year, and all of them are apparently healthy; scarcely a black-knot is to be found upon any of them, and upon some, none at all. And yet all of these trees stand less than two rods from infected cherry-trees.

Dr. Trimble in his work on Fruit Insects, remarks to the same effect as follows :—

> In the outskirts of Buffalo and Black Rock, N. Y. * * there were Black-knots on the Plum-trees, but I saw none on the Cherry-trees, as in New Jersey and many other places. (p. 90.)

So far as regards the Wild Plum (Prunus americana,) and the Wild Black Cherry (Cerasus serotina,) I can state the same thing from my own observations in the neighborhood of Rock Island, Ill. Both trees are very common there; and I have been familiar with both for many years. Yet, although on the former Black-knot is very common, I never saw a single specimen on the latter. Neither, so far as I am aware, have we any Black-knot on the cultivated Cherry.

But from the following observations of Mr. Isaac Hicks, of North Hempstead, N. Y., it would rather seem as if there must be more than one kind of fungus growing on the Cherry—one kind probably originating from the Wild Red Cherry, (Cerasus pennsylvanica,) which is closely allied to the cultivated Cherry, and thence spreading on to the latter, and the other growing on the Choke Cherry, (Cerasus virginiana,)* which, as well as the Wild Black Cherry (C. serotina), differs remarkably from the tame Cherry in the fruit growing like currants in "racemes." Clearly Black-knots of all kinds must have originated in Native American trees, and spread thence to our cultivated trees; for Black-knot is utterly unknown in Europe, whence both our cultivated Plums and our cultivated Cherries were originally imported. It will be remarked that Mr. Hicks, in the course of his very acute and valuable observations, confirms the above statements, as to the Plum Black-knot not extending on to Cherry or the reverse.

> It is evident there are several of the fungus that attack fruit-trees. There is one peculiar to the Wild Cherry, one to the common Cherry, such as the Morello and Duke class, and one that belongs to the Plum. Each variety of trees mentioned has its peculiar style of fungus, as much as different species of animals and insects have peculiar parasites which prey on them. About forty years ago the Black-knot swept off all of a kind of bitter-sweet Cherry that was quite common here, the name I do not know. About seven years ago the fungus attacked the Cherry-trees to the west of this place, in King's county, Long Island, especially the Kentish and Early Richmond, and nearly killed them all. It gradually spread to this place, moving eastward, and attacked the trees on the west side of the orchard first. All efforts by burning and cutting, proved unavailing, for being propagated by minute spores, they spread from my neighbor's trees, and hence our single efforts were unavailing. They now appear to be clear from this pest such as were not killed, and perhaps this generation will not be troubled again.
>
> The Plum fungus has its periods of increasing, in certain places, to a great extent, and again being nearly extinct. We may state that the Plum knot did not prevail here at the time of the Cherry-tree disaster, nor did the Wild Cherry knot show any thing of an increased abundance. The spores of the Cherry-tree fungus find more resistance, or rather the bark of certain kinds does not allow them to lodge and grow on those varieties as well as on others, as the Morello class were sadly knotted, while the Mazzard was entirely free, and Elton, Downer's Late, Honey, &c., were nearly or quite free.
>
> Now we believe and argue, that the kind of fungus that destroyed the bitter Cherry forty years ago, could not be the same as the present fungus on the Cherry, or else it would have also attacked the Kentish and others then. And if the Plum knot is not caused by a different fungus from the Wild Cherry, why does one prevail on one kind of tree at a certain period while the other is free from it? (*Gardeners' Monthly*, November, 1866, p. 335.)

The practical inference to be drawn from the above theory is, that plum-growers need not be alarmed when their neighbors' cherry-trees are swarming with Black-knot, and cherry-growers need not be alarmed when their neighbors' plum-trees are infested in the same manner. For the disease can only spread from plum-tree to plum-tree, and from cherry-tree to cherry-tree; just as the Mildew and the Rot on grape-vines can never spread on to apple-trees or currant-bushes. It would further seem to follow, that Black-knot growing upon the wild Choke Cherry cannot spread upon our cultivated Cherry, and still less upon our cultivated Plum-trees; but Black-knot undoubtedly can and does spread from the wild Plum-tree on to the tame Plum-tree, and probably from the wild Red Cherry on to our tame Cherry-trees.

Strictly speaking, this Black-knot question belongs to the Botanists rather than to the Entomologists. But as the saying is, I have already "put my foot into it," and according to another old saying, "One may as well be hung for a sheep as for a lamb."

B. D. W.

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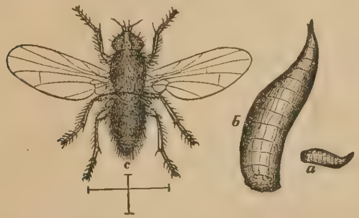
* The wild Choke Cherry in some places is nearly dispatched by the ravages of the Black-knot." (*Gardeners' Monthly*, June 1866, p. 170.)

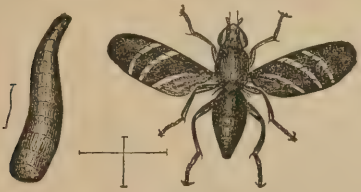
IMPORTED INSECTS.—THE ONION FLY.

Dr. Fitch has recently shown, that the maggot that terribly infests the bulb of the Onion in the Eastern States, often to such an extent as to cause men to give up growing that crop, is produced by an imported Two-winged Fly, (*Anthomyia ceparum.*) According to him, it has been in this country forty years or more. (*Ann. Reg. Rur. Aff.*, 1867, p. 91.) The annexed right hand figure shows this insect in the maggot or larva state; the left hand figure the perfect fly bred therefrom. So far as I am aware this little pest has not yet spread into the Western States; but doubtless in due course of time it will do so.



Color—ash-grey. Color—white.

More than a year ago Dr. Shimer, of Carroll Co., Ill., showed that the onions in his garden were infested in the same manner by another two-winged Fly. This fly, upon being submitted to competent entomologists, proved to be the *Ortalis flexa* of Weidemann, which is not an imported but a Native American insect, and which had been previously credited to the State of Georgia. The annexed figures show the larva and the perfect insect of this species, the hair lines here and before denoting the natural length of each. It will be seen at once that it differs widely from the imported insect, not only in the shape of the larva, but in the coloring of the Fly, which, instead of glossy transparent wings, has them of an opaque black color, with three conspicuous white stripes on each.



Color whitish. Color blackish.

It is very remarkable, that while the imported Onion-fly is such a grievous pest in the East, the Native American Onion-fly seems not to occur at all in the East, and to have been only noticed as yet by a single individual in the West, unless indeed, which is probable enough, the "Western onion maggot" found near Peoria, Ill., by Mr. E. G. Johnson, belonged to this species. (See *N. Y. Tribune*, April 10, 1866.) Yet the insects belong to allied genera of the great *Musca* family. How then can we account for this strange fact? We can only account for it, I think, upon the same principles, upon which I recently endeavored to explain the analogous case of the two Gooseberry Sawflies—namely, that our N. A. creation is of an inferior and weaker and less highly developed type, than that of what is popularly known as the Old World. (See PRACTICAL ENTOMOLOGIST, I, pp. 117—9.)

There is still another analogous case, illustrative of the above theory, to be met with in the Meal-worm Beetles. The imported species (*Tenebrio molitor*) swarms throughout the whole country and is a great pest; while the Native American species (*Tenebrio obscurus*,) is comparatively rare and is scarcely known to the millers and flour-dealers.

A third case of the same kind may be found in the Imported Bark-louse and the Native American Bark-louse. (See PRACTICAL ENTOMOLOGIST, II. p. 31—2.) And it would not be difficult to show, that many more such cases are to be met with in the various departments of Entomology.

As to the best mode of destroying these Onion-maggots, it has already been shown in this journal, (I, p. 20.) that boiling hot-water poured over the young plants will destroy the maggots, without at all injuring the plants. The only other known remedy that is reliable, is to pull up such plants, as, from their drooping state, may be known to contain maggots in their bulbs, and destroy them in any convenient manner. B. D. W.

DO CUT-WORMS DESTROY TREE BUDS?

By John Townley, of Marquette Co., Wisconsin.

During the last two years at least, young apple-trees in this locality have been much injured by having their buds destroyed. My observations last spring led me to conclude, that a worm very like the cut-worm, and having the same habit of hiding just beneath the surface of the soil during the day and feeding by night, was the cause of the mischief. But as, in no work on gardening matters to which I had access, could I find the cut-worm included in the list of insects injurious to fruit trees, I had some doubts as to whether my conclusions were well founded. I find, however, in the June number of Vol. 1 of the PRACTICAL ENTOMOLOGIST, that not only is it probable that these cut-worm-like insects destroy the buds, but that the fact is comparatively new to Entomologists, as well as to the growers of fruit generally. I have thought, therefore, that a brief account of my experience in this matter here, might not be unacceptable.

Soon after snow had gone in 1865, I pruned a lot of apple-trees then four years planted. The wood at the time seemed alive and sound. When older trees were coming into leaf, these remained almost destitute of foliage; and on examining them, it was found, that most of the buds, especially those on shoots formed the preceding year, were gone—removed as clean as if they had been picked out with the point of a knife. The bark in small patches near the ends of some of the shoots had also been eaten or chipped off. As many small birds had been seen about the trees, the conclusion was arrived at that they had probably eaten the buds. In the fall, mounds of earth were thrown up around the stems of these trees, and of another lot two years planted. These mounds were being levelled on the 6th of May last; and soon after commencing the work, several rather large cut-worm like grubs were noticed. This, coupled with the fact, that in the preceding spring, I had caught a worm like these in the very act of eating out a bud high up the stem of a young Catalpa, around which I had thrown a blanket the evening before, to shield it from frost, induced me to suspect that they and not the birds destroyed the buds. This led to an examination of the untouched mounds; and in the soil immediately surrounding the stem of each tree, I found from about five to ten of these worms. Twenty-three were taken from the soil round a plant of the Rome Beauty apple. To save my trees, I knew of nothing likely to be so efficient as persistent hand-picking. I therefore searched the soil round the trees every other day, (a stout table fork is handy for this purpose,) taking one lot one day and the other the day after; and I continued for some time to find more or less of the worms, and always near the stems of the trees.

Previous to the 6th of May, buds had been destroyed but not to the same extent as in the preceding year, owing probably to the spring being a late one. On a warm dewy night about the middle of the month, I took a lamp and suddenly jarred several of the trees; when some of these worms came tumbling to the ground. The evidence against them would have been more conclusive, if I had searched the branches and found them there and at work. That however, I omitted to do. I have had fruit-trees planted here sixteen years, but never had the buds destroyed so as to attract my attention before the last two years; nor have I had any complaints from my neighbors on this point, except during that time. Orchards are not very common here, but in three others in this town, I know young trees have been injured as in my own during the last two years.

There is a paragraph in the *Agriculturist*, for June, 1866, in which I suspect birds are blamed for the work of these insects. It is said there, that J. Hyde, of Washington County, Ill., finds his *peach-twigs wholly stripped* of buds; and that he thinks it was done by a bird, and wishes to know what bird does it. It is then remarked, that partridges eat buds of apple-trees, but were not known to touch those of the peach. In deep snows, when hazel catkins have become scarce, partridges will visit the orchard, usually very early in the morning and late in the evening; but the buds they feed upon are blossom buds, or the prominent buds of spurs, not unfrequently wrenching off and swallowing part of the spur as well as the bud. Partridges, however, could not stand on many shoots on my trees, the buds of which have been destroyed, nor could they reach them from neighboring branches.* And I think it would puzzle even a wren or the white-throated nuthatch, to eat the buds and the bark of some slender, nearly horizontal twigs which were thus injured.

The PRACTICAL ENTOMOLOGIST states, that by the term "cutworm" is to be understood a 16-footed worm. I counted 14 legs only on these worms—three pairs of spine-like legs in front and four pairs of what appear to be called prolegs in the hinder part. Are the two others situated on the last joint of the body counted to make up the number 16, and are these two the so-called "anal prolegs? [Yes; B. D. W.]

I have not found the young shoots of trees or shrubs cut off in summer, as described by Dr. Harris. In the extract from the *Prairie Farmer*, it is said that "these worms prefer dwarf pears and apples, and that the longer stemmed trees of orchards are almost exempt from their attacks." I grow no dwarf apples; mine are all standard trees worked on the ordinary apple stock. I have not noticed whether fruit buds are first taken, but older bearing trees have not had their fruit buds destroyed the last two years. Currants, gooseberries, and raspberries, though growing near these infested apple-trees, have not had their buds destroyed. My last year's crop of the two last named fruits was indeed the best I have ever grown here. The buds of Roses, Spiræas, Weigelias, Honeysuckles and Lilacs have not been taken hitherto. Grape vines have had some buds destroyed, but by what means I do not know. Every bud save two was destroyed on the Catalpa, the night it was covered. The buds were but just starting, appearing to the naked eye like small purple points, and they were eaten away to the very wood. A small plant of the common snowball shrub planted last spring had two sets of buds destroyed. I then cut the head well back and tied it up in musquito netting. Latent buds finally started, and my plant was saved. The buds of this plant were probably destroyed by the cutworms, but I have no proof that such was the case.

The various expedients I have adopted, to keep down the ordinary cutworm, are probably generally known. Hand-picking ranks first. By taking advantage of the odds and ends of time, garden plants may be looked over daily, and wherever a plant is cut down the worm should be found and destroyed. By taking a lamp and making a raid upon them on warm still nights, their ranks may be considerably thinned. The paper funnel affords considerable protection to newly-planted things, if stiff writing paper is used. An old lady of my acquaintance is in the habit of placing manure under any plant she wishes to protect from cutworms; her notion is that the worms will feed upon the manure in preference to the plant. [This must be a mere notion. B. D. W.] I have observed where manure has been applied as a top-dressing early in the fall, as to rhubarb and asparagus, or as a mulch in summer to fruit-trees, and not forked under in the fall, that the following spring, soon after frost was out of the ground, it would contain great quantities of cutworms, sometimes so numerous and so small that I think they must have been bred there. [Scarcely: they hid under the old dry manure during the day. B. D. W.] Hens make short work of them when found in such situations. Those who have no hens, or who prohibit them from entering the garden, may easily destroy the worms by first turning the manure upside down, and then applying boiling water from the rose of a watering can. I have also found that numbers of moths may be captured and destroyed, by leaving a window of an upper room open during summer; and it has occurred to me that if some safe lamp were placed in a milk pan half full of water, on a chair, so as to be about level with the opening in the window, this trap would prove very efficient. Does any reader know any better method of keeping under this pest, than those stated above? If cutworms are so numerous and annoying throughout the United States, as they have been here the last two or three years, the genius, who can invent some cheap and effective apparatus to destroy moths by wholesale, would deserve to be held in everlasting remembrance, and the nation could well afford to pay him a very large pecuniary reward.

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* [In further illustration of this subject, which has already been referred to in the PRACTICAL ENTOMOLOGIST (Vol. II, p. 46, note 2nd.), I clip the following from the *New York Semi-Weekly Tribune*, March 1, 1867.—B. D. W.]

In a Bad Box.—D. BYRON WAITE, Springwater, N. Y.: I have an orchard adjoining a few acres of beech and maple, with heavy undergrowth, and the partridges come out and eat and strip the buds from the apple-trees, and last year those nearest the woods did not bear a peck, while those at a distance bore well. I have not killed a partridge for fifteen years. I do not believe in killing birds; but what shall I do?

The answer is, do nothing. It would not be proper even to scare the partridges, for that would hurt their feelings.

["Surgaring," with poisoned molasses will probably be found the cheapest and most effective and most wholesale method of destroying the moths, both of these Tree-cutworms and of ordinary cutworms. For directions, see PRACTICAL ENTOMOLOGIST, II, p. 53.—B. D. W.]

ENTOMOLOGY RUN MAD.

The following article, from the pen of an anonymous writer, appears in the North Carolina *Rural Journal* for September 1866, and contains almost as many errors as sentences. The author seems to have confounded together four very distinct insects. 1st. Some unknown species feeding on the buds of plants, perhaps a Tree-cutworm (*Hadena.*) (See PRACTICAL ENTOMOLOGIST, I, p. 85, and II, p. 64, 67.) 2d. A Spindle-worm burrowing in the stem of the young corn, probably allied to the notorious *Gortyna zeæ*. 3d. A larva boring the stem of the hogweed, probably, like the Spindle-worm, that of some moth, or it may be that of some Saw-fly, (*Tenthredo.*) 4th. "The active and sparkling fire-fly," as he calls it, which must be some species of Lightning-bug, (*Photinus* and allied genera,) as the only other luminous genus of true insects, (*Pyrophorus*,) belongs to the Click-beetles (*Elater* family), and is not found, I believe, further north than Louisiana. Now, in the larva state, all these "Lightning-bugs" are cannibal insects, preying upon various species of borers; and consequently a vegetable-feeding larva, such as he represents his "bud-worm" to be, could not change as he represents it to do, into a "fire-fly."

THE BUD WORM.

This little insect, whose rapacity the farmer has so much reason to regret, is not more than a half inch in length, with a black or dark brown head, body of a white color. The peculiarity of having a dark-colored head will serve to identify the worm in the earlier days of its growth, but I have observed that the head becomes of the same color as the body, as the worm approaches maturity. Its growth is quite rapid, but during the few days necessary for its maturity it will destroy a score of stalks of corn. One fact that struck me with peculiar interest, is that the ovum from which this worm is produced is hatched during the fall, and the insect attains to very nearly the size of which we see him in early spring, inclosed in the center of a weed, (generally the hogweed.) The pith of the weed seems to furnish his food. You may readily detect the point at which the egg was deposited by the small perforation in the weed, and you may thence track him for several inches by the delicate canal he has left behind. About the eighth day after leaving the place of incubation, there appears a great change in his appearance. The body which has grown to twice its original diameter and increased somewhat in length, becomes marked with longitudinal streaks of a black color alternating with white ones of the same width, the head as we have said losing its peculiar color. The motions of the worm now become sluggish, and there appears about the upper third of the body, and on either side, an enlargement of the skin, resembling a puff in a lady's sleeve. This indicates the point at which the wings are soon to protrude. The worm is now ready to make one of the changes of insect life, and as if providing against a period of inactivity, he selects a large stalk of corn. A day is now all that is necessary to effect the metamorphosis, and instead of the loathsome budworm we now have the active and sparkling fire-fly. This is the history of the budworm obtained from careful observation and experiment. But, of what is of vastly more importance, namely, a remedy against its ravages, I am sorry to say that I know nothing. J. S. D.

Commenting on the above is almost like commenting on the Book of Mormon; but it may perhaps be worth while to point out a few of the more obvious mistakes.

1st. We are told that "the peculiarity of having a dark-colored head will serve to identify the worm in the earlier days of its growth." I know more than a thousand larvæ that have this "peculiarity." In fact, with a few exceptions, all boring larvæ have a dark or reddish or yellowish head, and a pale body.

2nd. Speaking of the hogweed borer, we are informed that "you may readily detect the point at which the egg was deposited by the small perforation in the weed." This is not the case with any borer known to me. The minute hole by which the egg is inserted, or by which the minute larva eats his way in after hatching out from the egg, always closes up and becomes undistinguishable. The hole seen by this writer must have been that made by almost all boring larvæ, to afford a passage for the perfect insect.

3rd. The "great change" spoken of as occurring in the same larva, after it has migrated from the hogweed to the corn, is simply due to the hogweed borer being an entirely distinct species from the borer that inhabits the corn. Although many larvæ change color very remarkably as they progress to maturity, yet it is absolutely incredible that a larva when young, should be white with a dark head, and, when full-grown, have its body striped lengthways with black and white, and its head "the same color as the body." Evidently J. S. D., not being aware that there are thousands of different kinds of borers, and finding one borer in Hogweed stalks and another in Corn stalks, jumped to the conclusion that the two must be one and the same insect, and manufactured "out of whole cloth" that story about its migrating from Hogweed to Corn, which is contrary to all entomological analogy.

4th. The "enlargement of the skin on the upper third of the body, resembling *a puff in a lady's sleeve*," is rather loosely defined, seeing that the writer does not refer us to any particular fashion-plate in any particular Lady's Magazine. But I suppose from the context, that this must refer to the insect's passing into the pupa state. Now, in the pupa state, all borers without exception lie still and eat nothing; in fact they have then neither legs to walk with, nor mouth to eat with, nor *anus* to discharge their *fæces*, although many of them have an apparatus of little hooks, by which they work their way for some short distance out of the earth or the vegetable substance, in which they had previously lain imbedded. How then can it be possible for this boring pupa of J. S. D.'s to travel about in the open air and "select a large stalk of corn?" He might as well tell us that a corpse screwed up in a coffin could travel about in a Cemetery, and select a large and handsome tomb. One thing is just as possible as the other.

5th. The North Carolina farmers need not go to work to destroy the "fire-flies," under the false idea that they produce "bud-worms;" for, as I have already shown, fire-flies in the larva state are *beneficial* and not *noxious* insects—the *friends* and not the *foes* of the farmer.

Moral.—Before men undertake to write about the Natural History of Insects, they should learn the rudimental principles of Entomology. B. D. W.

THE IMPORTED GOOSEBERRY SAW-FLY.

(*Nematus ventricosus.*)

Mr. Jas. H. Parsons, of Franklin, Delaware Co., N. Y., informs me that it is this insect, and not the Native American Saw-fly (*Pristiphora grossulariæ*,) that infests his currant bushes, as the larvæ were "green covered with black dots." "It first," he says, "made its appearance in his neighborhood three years ago, completely defoliating currant-bushes in certain localities, in others scarcely injuring them at all. In 1865 it was very destructive, generally continuing till late in August. But in 1866 it appeared and disappeared in May on his own bushes, re-appeared in June, but disappeared again before the close of the month and was n[illegible] seen afterwards." The re-appearance in June was probably caused by some of the pupæ, that had wintered underground, failing to develop into flies as early as usual, as I had several flies of the second or summer brood, that did not come out till nearly a month later than usual. (Practical Entomologist, Vol. I, p. 120.) The non-appearance of the usual second brood in 1866, must have been due to the first brood having been preyed upon extensively by some insect or other enemy, or possibly to heavy rains or other peculiarities of weather.

Mr. Parsons also says that "*measure* currant-worms" (evidently those of the *Ellopia ribearia* of Fitch,) "about 1¼ inches long and of a yellow color with black dots, were found upon his bushes in 1865 and 1866, though in small numbers. In a pint of the green worms of the imported Saw-fly there would not be found perhaps more than a dozen of the yellow measuring worms." (Respecting these last, which are a Native American insect, see Practical Entomologist, Vol. I, p. 122.)

B. D. W.

TREE CUT-WORMS.

On pages 85–6 of the First Volume of the Practical Entomologist, I gave an account of certain Cutworms, which Mr. Riley of Chicago had ascertained to climb trees and destroy the buds thereon. I then and there stated my belief, that these insects would prove to belong to the genus *Hadena*. At the Illinois State Fair I saw a moth in Mr. Riley's collection, which he had bred from one of his three tree-cutworms, described by him as the "Dark-sided Cutworm;" and it proved to be really a *Hadena*, and either identical with or closely allied to the species known as *chenopodii*, which I had myself bred from pupæ dug up in my garden. B. D. W

DOCTORING FRUIT TREES AGAIN.

The following article is from the *Industrial Gazette*, Louisville, Kentucky, of December 15, 1866. There is no Saratoga county in Kentucky, and consequently the "fact worth knowing" probably hails from Saratoga county in New York.

> A gentleman of Rochester was lately in Saratoga county, and was there shown an apple-tree in fine healthy condition, which had been ill, subjected to treatment with calomel, and thoroughly cured. This tree was afflicted with insects, which were destroying it and rendering it unproductive. A hole was bored into the body of the tree nearly through the sap, and two grains of calomel inserted. As soon as this calomel was taken up by the sap, the vermin on the tree died, and it began to bear fruit and has done so for three years, to the entire satisfaction of the owner. Sulphur may be mixed with the calomel and produce a good effect. This is a fact worth knowing.

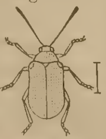
It is much to be regretted, that the author of the above did not see fit to inform us, what particular kind of "insects" were infesting the sick apple-tree. It is possible that Calomel may be good against Bark-lice, and bad against Plant-lice, effective against Borers and useless against Canker-worms, death upon Caterpillars and life and health to the Apple-worms that bore into the cores of our apples. Or must we believe that, like certain quack medicines for the use of the Human Species, Calomel will cure every ill that Apple nature is subject to? There cannot be the least doubt, however, of what the article asserts, namely, that "*as soon as the Calomel was taken up by the sap*, the vermin on the tree died." For it is chemically impossible that the sap ever should "take up" calomel, seeing that sap can only take up such substances as are soluble in water, and calomel, as every child knows, will not dissolve in water. The writer might as well try to make us believe, that sap can "take up" sand or gravel, as "take up calomel." One thing is just as possible as the other. And the same remark applies to the sulphur, which is recommended to be mixed up with the calomel. In the 1st volume of the PRACTICAL ENTOMOLOGIST, (p. 125,) will be found recorded a case, where sulphur had been introduced into several ½ inch auger holes, bored in peach-trees, and still remained there two or three years afterwards. Whereas, according to the New Patent Tree-doctors, it ought to have been long ago absorbed into the circulation of the tree. And on page 96 of the same volume there is another case recorded, where 27 pounds of sulphur, plugged up in 120 apple-trees, utterly failed in killing the cankerworms.

I lately heard of a lady who was cured of a violent headache, by her husband presenting her with a new bonnet. As soon as the bonnet was put on her head, the head-ache left her, and never returned for three or four years afterwards. This is just as good proof that bonnets cure head-aches, as the above quoted case from New York is that calomel cures sick apple-trees. I strongly suspect that, in both instances, there would be certain unexpected facts developed on a rigid cross-examination of the witnesses. B. D. W.

THE GRAPE-VINE COLASPIS.

(*Colaspis flavida* Say.)

From several answers to correspondents it will have been noticed, that this insect has preyed extensively on the terminal shoots and young leaves of the grape-vine, in Ohio and Illinois, in the summer of 1866. From a letter of Dr. Fitch's published in the *Country Gentleman*, of Aug. 30, 1866, it appears that what from his description must be the same insect has "destroyed grape-vines by the wholesale" in Massachusetts, and that in New York, in Dr. Fitch's own neighborhood, "it has been the worst enemy that has attacked the vine, riddling the leaves with small round holes, interspersed with larger irregular ones." Dr. Fitch has also heard of it in several other parts of the country; and what is probably the same species is mentioned by Mr. Glover, as having been near Washington in 1866 "very injurious to the foliage of the grape-vine, in which the perfect insects eat innumerable small holes." (*Agric. Report* 1865, p. 91.) The annexed figure will give a good idea of this little pest, the hair-line showing its natural length.



Colors, cream-color and black.

Instead of referring this insect to the *flavida* of Say, Dr. Fitch has chosen to name it as the *Colaspis brunnea* of Fabricius. Fabricius's descriptions are generally so very short, that it is often impossible to be certain, from the descriptions alone, what particular species he refers to, when several distinct species co-exist in the same country which resemble one another very closely. This is the case in the present instance. There is another beetle of precisely the same size and shape, which is equally abundant with Say's *flavida* and occurs in the same localities, and to which Fabricius's description will apply nearly as well as to Say's species. This second beetle, however, is a very distinct species, and is the *Colaspis costipennis* of Dejean's Catalogue, as I have been informed by Le Conte. It differs from *flavida*, in the thorax and head being of a dark metallic greenish color, (not yellow tinged with rufous,) and in the wing-cases being pale brown, each with four smooth slightly elevated pale yellow longitudinal lines, the two outside ones and the two middle ones respectively uniting behind in an acute angle. In *flavida*, on the contrary, there are on each wing-case, eight (not four) such pale yellow lines. It differs also from *flavida* in the last 3 or 4 joints of the antennæ, being uninterruptedly brown-black; whereas in *flavida* the last joint or two and the tip of the last joint but four, are brown-black, leaving the intervening two or three joints always pale yellow or cream-color. This very remarkable colorational peculiarity occurs also in *Colaspis prætexta* Say, but it does not appear to have been hitherto noticed by authors, either in *prætexta* or in *flavida*, and Dr. Fitch does not notice it in the description of his *Colaspis* referred to above.

As a general rule, where an old author, like Fabricius, has described an insect so loosely and briefly, that it is impossible to identify it with any certainty, and a modern author, like Say, has published a good and full description of it, it is better to use the modern name. For the law of priority, according to which the name given by the first describer takes precedence of all succeeding ones, only applies when the description is such that the species may be identified with comparative certainty. There is no greater nuisance in science, than authors who are perpetually exhuming old dead and buried and forgotten names, based upon descriptions which are good for nothing, and foisting them into the places of names which are in universal acceptation in the scientific world. Science should deal as much as possible in things and as little as possible in words.

It may seem strange to novices, that a particular insect, which had never been noticed before as injurious, should swarm in this manner all over the United States in a particular year, on the particular plant which it infests. But in this case the insect is what would be popularly called a small one, and it is only of late years, that people have begun to awake to the practical importance of attending to such matters. Besides, it is only of late years, that the grape-vine has been extensively cultivated in the United States. There can be no doubt whatever, that the insect has always existed in this country, in the woods, preying upon the different species of wild-grape. I have never failed myself for the last eight years, to capture numerous specimens of it in the woods in Illinois, every year. Instead of wondering why particular insects should swarm in particular years, far beyond their usual numbers, the wonder with me has always been—

considering the prodigious number of eggs laid by almost every species—that the great Antagonistic Balance between cannibal and parasitic insects and other insect-devouring animals on the one hand, and the plant feeding insects on the other hand, should be so admirably arranged by an All-wise Providence, that but very few disturbances occur in the harmonious adaptation of all the parts of the great System of the Creation. B. D. W.

ANOTHER UNIVERSAL REMEDY.

I find the following in the *Country Gentleman* of Jan. 10, 1867, evidently reprinted from some California paper. It has since started on its travels through the Agricultural Press, with most of the references to its Californian origin suppressed.

> One Smith, of Tolano county, [in California,] having had his trees very much injured by worms, said he would very willingly give fifty dollars to know of a remedy that would keep them down. We advised him to try one remedy, viz: To bind a bundle of the boughs or twigs of the red cedar around the body of each tree, with the butts uppermost. We have since heard that the experiment was entirely successful; though armies of worms made a charge upon them, he had a full supply of peaches and other fruit.
>
> It may not be generally known, that worms and insects of any kind are very rarely seen upon any of the varieties of the cedar family. We think that red wood and white cedar thus packed around the body of trees, would be very advantageous in protecting any kind from the miller or worms, to be applied near the ground every spring.
>
> *Kern County, Cal.* S. W. JEWETT.

It is quite manifest, that such a remedy as this can be of no avail whatever against winged insects, that deposit their eggs on the limbs or twigs or leaves of the tree. Against species, such as the notorious Cankerworm, where the female moth is wingless and has to crawl up the trunk of the infested tree, in order to deposit her eggs thereupon, it may be more or less effectual; on the same principle that bands of cotton-wool round the trunk, or tarred bandages wrapped round the trunk, or sorghum molasses smeared on the trunk itself, form a mechanical impediment to the ascent of the female insect. It may also prevent the periodical ascent of tree-cutworms from the ground on to the tree; (see Practical Entomologist, I, pp. 85—6,) for it has been already shown that they have such worms in California. (*Ibid.*) Lastly, it may prevent such worms or caterpillars as, having stripped the tree on which they were raised of its leaves, are on their travels in search of other trees, from mounting the tree thus protected. But that it can be of the least use against any other insects, I do not believe. It is a mistake to suppose, because a particular insect will not eat Red Cedar, that therefore the presence of a bunch of Red Cedar a few yards off would be offensive to it. If this were so, trees growing near a Red Cedar bush would be free from insects, which is certainly not the case.

The trouble in this, as in so many other cases, is, that inexperienced persons do not sufficiently attend to the very wide difference in the habits of different Insects. Because Red Cedar boughs have prevented Tree-cutworms and one or two other particular insects, under particular circumstances, from mounting fruit-trees and destroying their buds or their foliage, therefore it is inferred that it will keep off all other "worms." As well might we infer, because Sulphur cures the Itch, that therefore it will cure the Gout. As well might we argue that, because a Cow will eat timothy hay, therefore a Hog will do the same. Finally, we might as well insist upon it, because the Indians of California habitually eat rats and mice, lizards and snakes, grasshoppers, crickets and caterpillars, and consider as an especial delicacy a white grub as big as a man's thumb found in old rotten wood, that therefore civilized Americans have the same eccentric habits. B. D. W.

BORERS.—The Plug-ugly Theory.

The following is going the rounds of the Agricultural Press, and as it contains the very quintessence of conceit, ignorance and folly, I propose to nail it to the counter as base coin.

> Borers in Apple Trees.—Much has been written about this pest, and the whole of it does not amount to any thing. When you find that one has made a hole in the tree, drive in a plug. That is death to them.

The writer evidently supposes, that the borer perishes for want of air when the plug is driven in. So far is this from being the case, that in breeding borers, as I know by experience, the great object is to exclude the air from them as much as possible. Several years ago, having split several boring larvæ, nearly an inch long, out of honey-locust timber in the spring of the year, and being desirous to find out what beetle they would change to, I took a solid block of honey-locust wood, bored three nice smooth holes in it, to the depth of an inch or two, with a stock-and-bit of suitable size, slipped a single larva head foremost into each hole, and then plugged up each hole with a a round oaken plug, driven in with a hammer so as to be as nearly air-tight as possible. According to the "Plug-ugly" theory, all of these three larvæ ought to have died forthwith. The plug would have been "death to them." But what were the facts? They lived and flourished, boring hither and thither in the block, but never boring to the surface till twelve-months afterwards, shortly after which they came out all three of them as perfect beetles—the *Eburia 4-geminata* of Say.

Most boring larvæ make their way to the surface of the infested tree shortly before they are ready to assume the perfect form, or so nearly to the surface as to be merely separated therefrom by a thin layer of bark. If the hole that they have bored is plugged immediately, they will simply bore a new one, thereby doing additional damage. If the hole is plugged after they have assumed the pupa state, it may *perhaps* imprison the perfect beetle and prevent his making his way out to propagate the breed, but it in no way lessens the damage done by the individual insect. But if, as is most usually the case, the hole is plugged after the perfect beetle has escaped, it is merely locking the stable door after the steed is stolen.

So much for the "Plug-ugly Theory." What next, gentlemen? B. D. W.

A MASS OF MISTAKES.

I find the following letter in the *Prairie Farmer* of Feb. 9, 1867, from a Nebraska correspondent:—

> REMEDY FOR THE BORER.
>
> EDS. PRAIRIE FARMER:—As I see that a remedy for the borer worm is inquired for, I send you mine, which you can publish, if you think it useful. For the last eight years, I have practiced hauling hickory wood on my farm every year, and placing it where it would attract the borer moth, and then burning it with the worm in it before the end of two years. I think that I have thus kept the worms in subjection, and that it will take but a small quantity of the wood to keep them so, if the requisite pains are taken to burn it before the worms come out.

Short as this communication is, it contains no less than three mistakes, as follows:—

1. None of the different kinds of borers that are known to infest Hickory wood could live in Fruit-trees; neither would the Beetles, produced from these boring larvæ, ever lay their eggs upon fruit-trees. They know better than that; for if they did so, the larvæ hatched from those eggs would perish.

2. There is no "Borer moth" known to breed in Hickory. All the Borers of the Hickory produce Beetles and not Moths; though the common Borer of the Peach and that of the Red Currant do produce Moths.

3. The "worms" never come out of Hickory as "worms" but as Beetles, into which the "worms" have previously changed.

Destroying the boring-worms in Hickory wood will have no more effect towards diminishing the number of boring-worms in Fruit-trees, than one Farmer's butchering a lot of hogs will diminish the number of his neighbor's sheep. Those that desire fuller information on this subject, can refer to my Paper on Borers, in the PRACTICAL ENTOMOLOGIST, Vol. I, pp. 25—31. B. D. W.

HOP-GROWING IN THE WEST.

There is a prospect that, for several years, a deal of money may be made by growing Hops in the Valley of the Mississippi. The Hop Plant-louse seems to have generally established itself within the last three or four years, in those Eastern districts where Hops were formerly grown to a very large extent, and to be utterly ruining the crop. The probability is, as I have already suggested, (PRACTICAL ENTOMOLOGIST, II, p. 41,) that this insect has been recently imported from Europe; and in that case it will probably continue its ravages for a considerable length of time in the East, before it finally works its way to the West. Hence, for many years to come, Western Hop-growers will have a great advantage over their Eastern competitors. The following extracts from a letter, which appeared in the *Country Gentleman* of Jan. 31, 1867, will give a very good idea of the amount of damage done by this insect, wherever it has once become firmly established.

> In the year 1864, hops were attacked by lice so as to nearly destroy the crop, but some picked early and got a fair yield. But perhaps the experience of my first neighbor to the south would be a fair sample of many others. Geo. B. Brewster had a new yard of two acres; the cultivation was perfect; it was a model yard. He harvested over one ton (2,000 lbs) of hops in 1865, which he sold for 30 cents per pound. In the spring of 1866 he hired two other yards, an acre or more in each. In his own yard he harvested 200 lbs. In one yard that he hired he got $55 worth, and the other he plowed up and sowed to oats, getting less than 500 lbs. where he might reasonably expect 5,000 lbs. The roots nearly all died in the winter. * * There seems to be a prospect that this branch of agriculture will soon become extinct, unless the causes which have proved so detrimental can be removed.
>
> *Irasburgh, Vt.* Z. E. JAMESON.

In the year 1866 a few acres of Hops were planted in the immediate neighborhood of Rock Island, Ill.; and the owner, who is an experienced English Hop-grower, informs me that the plant flourishes there, and that he has noticed no Plant-lice on it. It may not be amiss to caution Western men, to be careful how they import the roots or sets from infested Districts in the East. The Plant-louse of the Hop passes the winter in the perfect state; and a single female Louse, accidentally mixed in among a lot of sets, might propagate the breed here to an indefinite extent, before it was noticed by any one.

B. D. W.

THOUSAND-LEGGED WORMS.

[FROM A LETTER FROM JAMES H. PARSONS, OF FRANKLIN, NEW YORK.]

> My Onion crop last summer did very poorly. Instead of 40 bushels as I expected, I had but about 12 bushels. The onions were small or medium size, and when I pulled them, I was surprised to find that they had no roots, or at least very short ones, not more than half an inch in length. I was unable to account for the phenomenon, as I found but few onions affected with the "maggot;" and yet I noticed that the roots of every onion were covered with little "thousand-legged worms." (See Answer to Geo. W. Robinson, in December No. of PRACTICAL ENTOMOLOGIST, p. 34.) It did not occur to me then that these worms had done the mischief, as I had never seen them before on living vegetables—only on dead seeds in the ground, that had failed to germinate. They were from ½ inch long to nothing—some of them so small as to be scarcely visible. The smaller ones were white, the larger ones light brown, their bodies very lively and flexible, and their legs long as compared with the diameter of their bodies, say 1-16th of an inch in length, their bodies being considerably less than 1-16th inch in diameter.
>
> It occurred to me, last summer, to send you some of these worms, but I concluded that they were harmless creatures and it would not be worth while. I will send you some as soon as I can find them in the Spring, if you do not receive them from some other source. They may prove to be a great pest. I presume every square rod of of my garden has hundreds of thousands, if not millions, of these worms, little and big.

REMARKS by B. D. W.—The thousand-legged worms on your onions, were most probably the same species which I have described in the passage referred to above. Mr. Robinson mentioned that they occurred of various sizes, and that the young ones were, as you describe them, whitish. According to Dr. Wood, to whom I forwarded a specimen, my species is undistinguishable from his *Iulus cæruleo-cinctus*. In fact, although the body when recent is brown, as I have described it, when dried up it is always banded with blue on each segment. Dr. Wood's name must, of course, take precedence of mine. I shall be glad to receive the specimens promised by Mr. Parsons.

FIGHTING THE CURCULIO.

In the *Genesee Farmer* for 1853, p. 125, may be found the following decidedly original mode of heading off the "Little Turk," from the pen of a Canadian correspondent.

> It would have done you good had you seen my Jeffersons, Washingtons, Huling's Superbs, Green-gages, Columbias, Golden Drops, Apricots and Nectarines last year, all bending under a tremendous load of the finest fruits ever beheld in the neighborhood of Fort Dalhousie, saved as follows:—Placed two or three well-made windmills in the head of each tree, with a clapper attached to each, which struck upon a piece of steel, and when the wind blew kept up a terrible jingling noise; one and a half yards of flag tied up so as to float nicely in the air, as close to the tree as possible without touching it; and lastly, when dinner was over each day, I would catch up a sheet made for the purpose, and say, "Come, boys, hold the sheet," and I would jar the trees and kill all that fell upon it.

This reminds one of the old receipt for making good rich soup out of flint stones, which runs as follows:—

> Take three or four large flint stones; wash them very nice and clean, and let them simmer without boiling in two gallons of clear water for four hours, till the water has extracted nearly all the richness from them. Lastly, add three pounds of fresh beef, a few handfuls of sliced carrots and turnips, and a spoonful or two of sweet herbs, pepper and salt, and boil the whole for two hours longer. It would do you good to taste this soup and see how rich and palatable it is, and all made out of such cheap and common ingredients as flint stones.

I take it that the "windmills" and the "flags" were of no more use towards heading off the Curculio, than the flint-stones were towards making the rich soup. Without the "jarring" process, the Curculio recipe would be as ineffectual as the Flint soup recipe would be without the beef and trimmings. But the fools are not all dead yet; and when one does die, he always leaves a large family behind him. B. D. W.

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[From the Cincinnati Gazette, Ohio, August, 1866.]

> A few mornings since, Mr. B. F. Davidson, who resides on Madison street, between York and Columbia, in Newport, Ohio, was greatly astonished, upon rising at an early hour, to find his yard covered to the depth of several inches with butterflies, the most of them dead, and the balance so benumbed apparently as to be unable to move much. The bodies of the insects were as large as a man's forefinger, and their wings measured six inches from tip to tip. How they got into Mr. Davidson's yard, when not one was to be found in any other place in the city, is quite a mystery. Our informant thinks that there must have been ten bushels of them. Boys were engaged all morning in carrying them off by the basketful.

Observations by B. D. W.—From the statement that the bodies of these so-called butterflies "were as large as a man's forefinger," it is evident that they were not butterflies, but moths; and from the expanse of their wings being stated as "six inches," they must have been some one of the four species of *Attacus* common in the United States, probably the *Attacus cecropia*[*] of Linnæus, the larva of which feeds on Fruit-trees, &c., and which I have recently found actually feeding on Hickory, the usual food-plant of *Attacus luna.* No other case is on record of these insects occurring in large numbers; but the papers have recently contained accounts of flocks of butterflies, several miles long, occurring in California and the Eastern States. Many such cases are also on record in Europe. All our U. S. butterflies may be readily distinguished from moths by having a knob at the tip of their antennæ; and most moths are torpid or "benumbed" by day. It is very desirable that, when cases of this kind occur, a few specimens should be sent to some reliable Entomologist, so as to verify the species.

ANSWERS TO CORRESPONDENTS.

Thos. L. J. Baldwin, Delaware.—The blister-like elevations on the tubers of your potatoes, each about ¼ inch in diameter, and many of them run together into confluent groups, with almost all these blisters burst open above, and showing inside a rough, scaly, brown surface, are, I have little doubt, caused by some insect or other. But what insect? That question is difficult to answer, without receiving fresh specimens at various seasons of the year, from the time that you first notice this scabby appearance on your potatoes to the end of the autumn. As you say yourself, that you believe this "scab" on the potato to be the work of some insect, and yet that "you have not as yet been able to fasten the guilt on any insect, though you have been watching closely for several years," I should infer that the damage must be done by some species of such a minute size, that it escaped your notice. Otherwise it might be attributed to the depredations of some Snake-millipede (*Iulus*—see Practical Entomologist, II. p. 34, and figure) or centipede, or of some insect-larva, such as those of the Click-beetles (*Elater* family) or the common White Grub, which is the larva of the May-bug, (*Lachnosterna quercina.*)

Inside one of the blister-like scabs, in one of the two specimens sent, I found four thread-like milk-white cylindrical larvæ, over ⅛ inch long and 10 or 12 times as long as wide, with a large shining jet black head. These evidently belong to the Order Diptera, (two-winged flies,) and, I think, to the *Mycetophila* family, and probably to the genus *Sciara* in that family. From the presence of their excrements in many other "scabs," which contained no larvæ, I infer that most of the "scabs," perhaps all of them, were formerly tenanted by these same larvæ; but that the great bulk of these larvæ went underground before the potatoes were dug, to pass into the pupa state and come out into the winged fly state next summer, in time to infest other potatoes. The insect that would be produced from these larvæ, if they had lived, would be a minute gnat, resembling a mosquito, except that its legs are shorter, and it has got no long beak to suck blood with.

I incline to suspect that it is these insects that cause the "scab" in your potatoes, and that not improbably they have been introduced along with seed-potatoes from Europe. At all events, I have never heard of any such "scab" among potatoes in the Valley of the Mississippi. There are several species of *Sciara*, which are known to infest rotten potatoes in England, and some observers there have believed that they were the cause of what is called "scab" in that country on the tuber of the potato, which may or may not be identical with your "scab." (See Curtis's *Farm Insects*, pp. 460—1, where a larva very like yours is figured and described as breeding in decaying potatoes in England, and producing a certain species of *Sciara.*) It is possible, however, that the "scab" on your potatoes may be caused by some insect, entirely different from these which I find in the specimens sent by you; and that the latter have merely bred there, as they would breed in any other mass of decaying vegetable matter. I can only decide this point on the receipt of additional specimens during the ensuing summer.

That your "scab" is caused by the action of some insect depositing its egg in or near the immature tuber, say about June or July, seems to be indicated by the fact which you mention, namely, that "the tubers first formed are the ones most affected, and that it is those which are evidently of later growth that retain their natural smooth surface." This hypothesis is further confirmed by the fact, that a neighbor of yours whose potatoes have long been afflicted in this manner, "says that he introduced the disease upon his farm in seed-potatoes, procured from a distance about 10 years ago."

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[*] I find a notice in the *Prairie Farmer* (July 21, 1866,) about the larvæ of *Attacus cecropia* having "almost stripped" an apple-tree.

According to your account, this "scab" was "first noticed in Delaware about 10 years ago, is now widely-spread and is increasing every year, and if not checked, will eventually ruin the potato crop." I have little doubt that, as you suggest, is was to this disease that Mr. Thos. Conard, of Pennsylvania, referred, when he said that "his potatoes were badly nibbled by some bug or worm, and often almost ruined;" (See Practical Entomologist, I, p. 111;) though I erroneously understood him to refer, not to the tuber but to the leaf of the potato. Of course the "Three lined leaf-beetle" of the potato (figured Practical Entomologist II, p. 25,) can have nothing to do with causing your "scab;" more particularly as you say, that you "do not think there were over 200 of the larvæ of this beetle last year in about two acres of your potatoes, the vines growing luxuriantly;" and yet that "two-thirds of your potatoes are as scabby as the specimens sent," the tubers thus affected being "generally the smallest on the vine and evidently stunted by the disease."

It is, of course, impossible to indicate any certain remedy for this "scab," till we know for certain what causes it; and if it is caused by an insect, what are the habits of that insect. Until I can institute further and fuller investigations, I can only *guess* and grope round in the dark. But supposing my *guess* to be a correct one, I should recommend your farmers not, on any account, to plant any scabby potatoes, and not to keep any on hand or allow any to be about in the open air after spring opens. In cutting potatoes for seed, the scabby part should be removed and destroyed; and wherever possible, let the potato patch be located a considerable distance from last year's patch. By this means the multiplication of this Potato-gnat may be measurably checked; and if the gnat does really cause the scab, the scab will also be checked.

I should be obliged by your mailing me a dozen or two freshly cut specimens of your "Scab," packed in any tight little tin-box. The two already sent were as dry as tinder and pressed as flat as a pancake; and on soaking them in hot water to restore them to something like their natural condition, the larvæ got killed. I am very desirous to breed a parcel of these larvæ to the fly state this season, so as to complete the history of the insect at as early a date as possible. As to the gapes in Chickens, see the Answer to Milton Conrad in the last number of the Practical Entomologist, (p. 56.)

E. Daggy, Illinois.—The mass of eggs which you found on the branch of a plum-tree, are, I think, those of the moth of the Apple-tree "caterpillar," (*Clisiocampa americana.*) Besides the Apple-tree, this moth lays its eggs upon the Cherry, the Willow, the Birch, and several other trees; yet, strange to say, though the Pear is so closely allied to the Apple, all accounts agree that it never infests Pear-trees. Almost universally the eggs of this insect completely surround a small twig; but in the specimen sent, which was on a branch, they only reach about half way round. Possibly, therefore, they may be the eggs of another species of *Clisiocampa* (*Cl. sylvatica,*) which is occasionally found on apple and cherry trees, and the eggs of which have not hitherto been observed.

C. M., Illinois.—The eggs which you send as found both on pear and apple twigs, are those of the common Catydid, and precisely similar to those noticed in the Answer to Geo. Haines in the last number of the Practical Entomologist. I know from personal observation that our Catydids sometimes eat flies. Whether they feed almost exclusively on such diet, I do not know; but I incline to believe that they do. Otherwise, if they feed almost entirely on the leaves of the trees upon which they are found, what is to prevent them from occasionally appearing in vast swarms, as our common Grasshoppers do, and as certain wingless Catydids also do, which are known in California and the Rocky mountain region to have the same habits as Grasshoppers? All previous writers, however, have assumed, that all the species of the Catydid family feed exclusively upon vegetable substances. On the general principle that we ought not to destroy life wantonly, I should be inclined myself to let these eggs alone, wherever I found them.

Henry Morey, Illinois.—I cannot tell from your description what the "caterpillars" were, of which you found so many "nests" on the wild cherry, in the latter half of July. The caterpillar of a white moth, the *Hyphantria textor* of Harris, often makes web-nests on that tree, and sometimes on apple-trees, but much more generally on the Pig-nut Hickory, about that time of the year. But that is a 16-footed larva, not very unlike the common "caterpillar" of the apple-tree, except that it is only half as large: and you describe yours as without any legs at all, and as having "two spines at one end and four at the other, black and about 1-16 inch long." You say nothing about the size or color of your "caterpillars," or about the kind of "nests" in which they lived; and if your description be correct, they cannot be "caterpillars" in the entomological sense of the term, i. e. the larvæ either of butterflies or of moths. Please send specimens next summer.

Peter Ferris, N. Y.—The egg-bunches on your apple-tree twigs belong, there can be little doubt, to the caterpillar which devastated the orchards in your neighborhood so terribly last year. They are clearly distinct from those of the common tent-caterpillar (*Clisiocampa americana*), and, in spite of your belief to the contrary, I cannot help strongly suspecting that they will turn out to be those of the Forest tent-caterpillar (*Clis. sylvatica*), which ordinarily infests forest trees, but has been known sometimes to swarm on apple-trees. But in any case, time will soon solve the problem, as I expect to hatch plenty of larvæ from the eggs sent, which arrived in excellent order. Your neighbors are doing the very wisest possible thing, by gathering and destroying these egg-bunches, in order to rid themselves of the plague of caterpillars next year. As you say that from 50 to 100 egg-bunches are often formed on one tree, it is evident that, if left undisturbed, that quantity of eggs would produce caterpillars enough to strip the entire tree of every green leaf.

The double row of eggs so beautifully arranged in two parallel rows on an apple-twig are quite new to me. They are certainly not the eggs of any Grasshopper or Catydid; and I think they will prove to be those of some true Bug, (Order Heteroptera,) as they strongly resemble those of *Nabis fera*, a Canibal Bug found on grasses and the cereal plants. There are several kinds of the large stinking Bugs often found on blackberries and raspberries, which, as I have shown, habitually feed on caterpillars; and I should not be surprised if these eggs belong to some of these. I shall probably, however, breed from them, in which event I will let you know the result. They can scarcely be the eggs of any moth; as I know the eggs of all the species commonly found on the apple-tree.

M. M. S., Penna.—In reply to your three questions:—*1st.* I do not think that the darker or paler coloration in *Attacus Polyphemus* is caused by the food-plant. You say that those you fed one summer on honey-locust were, when the moths emerged, "of a clear pretty buff color," and those you fed another summer on silver maple, "of the usual color, dark or grayish." I have four specimens, all bred by myself from the oak, now before me, and they vary in coloration about as much as your language would seem to indicate. Similar variations occur in *Attacus cecropia*. *2nd.* The "brown woolly bears," which you speak of as often walking about in the winter, are, I suppose, the larvæ of *Arctia isabella*, which are brown-black at each end, and tan-red in the middle. Like several other lepidopterous larvæ, which often, on that account, puzzle young breeders of insects, these pass the winter in the larva state, and "feed up," as it it is technically termed, in the spring; i. e. go to eating a second time in the spring, so as to complete their full larval development. When you see them wandering about on warm winter days, they are not, as you suppose, "homeless and objectless, with no goal in view, dragging out a forlorn existence," but they are diligently and industriously searching for some stray blade of grass or small weed which, under the protection of the snow, has retained its greenness through the winter. They usually with me spin up early in May, and come out as moths some time in June. *3rd.* The moths which you bred from green larvæ feeding upon maple, were undoubtedly *Dryocampa rubicunda*. You will find a figure and description of it in Harris's *Injurious Insects*, p. 408; and a description of the larva, which feeds exclusively on maple and was unknown to Harris, from the pen of Mr. Lintner in the *Proceedings* &c. III, p. 426. The larva, as you correctly suppose, does not spin a cocoon, but goes underground to change into the pupa state, as is the universal habit of the family to which it belongs.

John Townley, Wisconsin.—The large whitish 16-legged grubs, or rather caterpillars, which you send are all of them the larvæ of a large gray moth—*Cossus robiniæ.* They live very commonly in the heart-wood of living Black Oaks and sometimes of other kinds of Oaks and Locust trees, boring it up pretty extensively. This does not materially injure the health of the tree—for a tree can live with all its heart-wood completely gone—but it ruins it for anything but firewood. The grubs in stumps and decayed wood are quite different from the above—indeed it is a very general rule, that the same insect does not bore indifferently into living and into decayed wood. Such wood-borers as are 16-legged produce moths; such as are 6-legged produce beetles of many different kinds, for example the different species of Horn-bugs, (*Lucanus;*) such as have no legs at all or only 6 very minute nipple-like legs, mostly produce Long-horned beetles (*Cerambyx* family.) The common "White Grub," which is also 6-legged and feeds upon living roots, is different again, and so are those 6-legged grubs which feed upon dung.

The fact of one of the larvæ which you send having been repeatedly frozen "as solid as a piece of candy," and as repeatedly come to life again, after sustaining a temperature of nearly 24° below zero, is one which every field entomologist is familiar with. These fleshy larvæ, however, both when they are alive and when they are dead, will stand a temperature much below 32°, without freezing. I attribute this to the juices of their bodies being more or less mucilaginous; for cold that freezes water will not freeze gum-water. I quite agree with you in the inference you draw, as to cold winters having little or no effect in destroying noxious Insects. It is excessively wet and excessively dry weather that often kills off insects; not excessive cold or excessive heat.

Besides the 17-year Cicadas (Locusts,) which occur in great swarms once in 17 years, and a few individuals of which are stated on good authority to occur in Long Island, N. Y. in the intervening years, there are several other species of Cicada which are not periodic in the time of their appearance. The fact of the striped Cucumber-bug not having troubled your neighborhood for the last two years is only one of many such anomalies. For example, in particular years the Army-worm, or the Rose-bug, or the Gray Blister-beetle will swarm; in other years it will take an Entomologist to find any of them.

F. L. Van Arsdale, Wisc.—The hairy larvæ about ¼ inch long which you send, and which you found in a case of insects apparently eating them up, are those of some of the destructive *Dermestes* family and probably of an *Attagenus.* They are a terrible pest in collections of Natural History, when they are once allowed to effect an entrance.

The best preventive is to keep a lump of good camphor, about the size of a walnut, in every case of insects, renewing it regularly every spring—to have your cases as tight as possible—and to keep them enclosed in an outer fortification, such as is afforded by a cabinet in which the cases slide as drawers, or by any tight closet, wardrobe or bureau, which you may find it convenient to fill with your cases. Camphor, however, does not kill the larvæ when they are already there. All it does is to deter the parent beetle from laying her eggs in such strong-smelling situations. To get rid of those larvæ which you have already in your cases, place the cases when the spring opens on some level surface; and you will soon see, from the gunpowder-like grains of excrement voided by the larvæ, which particular specimens are infested. Have ready a small tin pail with a tight lid to it. Lay a sheet of cork at the bottom of it, and place all the infested specimens on this cork. Then shut down the lid, and immerse the pail nearly, but not quite, up to the lid in boiling water, and hold it there for some ten minutes. You will find that the heat from the water will destroy, not only all the larvæ, but all the eggs that would otherwise soon hatch out into larvæ, without wetting or otherwise injuring the specimens. If you have many cases, and they are all badly infested, it would pay you to have a tight tin envelop of the proper size made to contain a single case, and immerse the whole nearly up to the lid of the envelop in boiling water.

C. M. B., New Jersey.—The oval, flattened, gray eggs about 3-16ths inch long, attached in two regular rows to the sides of a twig, and lapping over one another a little, but the contrary way to the lap of shingles on a roof, are the eggs of a Catydid. They are the same referred to in the answer to Geo. Haines in the last number of the Practical Entomologist p. 57.

Elias Nason, Mass., per The Horticulturist.—You say that "your winter squash vines grow splendidly up to a certain point, and then suddenly die;" that "you find no worm at the root;" and that "your neighbor's vines are quite as mortal as your own, and you must stop the disease or stop raising the article." In all probability it is the Squash-vine Borer that attacks them. This is a whitish 16-legged caterpillar, nearly an inch long when full-grown, which lives in the stem of the vines, usually pretty close to the crown of the plant, in August. It afterwards bores its way out, goes underground, and next summer comes out in the form of a pretty moth, (*Trochilium cucurbitæ,*) with its front wings black and its hind wings clear and glossy, which lays eggs on the young vines, from each of which eggs a minute borer hatches out and eats its way into the stem, the minute pin-hole, by which it entered, soon closing up behind it. You will find a good colored figure of this moth in Harris's *Injurious Insects,* Plate V. fig. 8.

The best mode of subduing this pest is to dig out and destroy the larva in every infested vine. Thus you will prevent it from going underground when full-fed, and coming out in the moth state the following season to lay its eggs for that year's brood. Wherever you find a vine drooping or sickly, dig into its stem near the root till you find the vermin. Do not be afraid of injuring the vine; for if *you* do not kill it, *the Borer* will, and the remedy cannot be worse than the disease, and *may* save the life of the patient.

The Editor of the *Horticulturist* observes, that he "has had the same trouble with his squash vines," but that now he "practices covering the vine lightly with earth close up to the first blossom, and thus generally succeeds in growing a crop of squashes." This is a very good preventive, as it debars the moth from laying her eggs on her favorite spot, namely the main stem of the vine pretty close to the crown. We fight the Striped Apple-tree Borer and the Peach-tree Borer precisely on the same principle, i. e. by precluding them from any access to the but of the infested tree, which is the favorite spot of those two insects.

A. W. Brumbaugh, Penna.—The cylindrical holes bored in your apple-twigs are made in May and June by the Apple-twig borer—the *Bostrichus bicaudatus* of Say. You will find a figure of this insect and a full account of its operations in my Paper on Borers, (Practical Entomologist, Vol. I, page 27.) The insect you send along with the bored apple-twig is a harmless one, belonging to the *Perla* family in the Order Neuroptera. In this family all the different species, so long as they are in the larva and pupa states, live in running water—under stones, under and about floating saw-logs &c., &c. Finally the full-grown pupa, (which, like that of a grasshopper, is as active as the larva,) crawls out of the water—its skin splits open in front—and out comes the winged Fly. Some species of the *Perla* family are 1½ inches long, and most of them, whether large or small, are known to Fishermen as "Shad-flies." In the Fly state they eat nothing; and in their preparatory states they feed on decaying vegetable matter. The particular species which you send is the *Tæniopteryx fasciata* of Burmeister, a very common insect.

The Rose-bug, as you suppose, deposits its eggs in the earth, where its larva hatching out feeds for two or three years on roots, before it finally emerges again to the light of day in the form of the perfect beetle. The best remedy is to jar (not shake) your infested trees upon a white sheet; or if you cultivate on a large scale, to use one of Dr. Hull's "Curculio-catchers," which will be fully described in the next number of the Practical Entomologist. Some grape-growers in the West find that the Clinton grape-vine is peculiarly attractive to this insect; and plant a single vine of this variety among their choicer varieties by way of trap. For the benefit of other subscribers, I will copy your description of the manner in which this pestilent beetle operates with you.

"In May and June they swarm in innumerable numbers, and are wonderfully destructive. I have a great many grape-vines; and they have taken all of them for the last 5 years. They destroy them when in bloom, and strip the vines of all the leaves. Next in rotation they go on to the peach, crowding on the fruit as thick as possible, even when the size of a hulled walnut; and next they go on to the apples. They have destroyed the fruit nearly all of it off 50 of my apple-trees, when it was as large as a small egg."

Elward E. Sheldon, Mich.—The larva, which hatches out from eggs laid on the Wheat-plant in the fall by the Hessian Fly, lives through the winter and comes out next spring in the form of the perfect Hessian Fly. You will find the history of this insect in the PRACTICAL ENTOMOLOGIST, Volume I, pages 108—9.

J. M. Cole, Missouri, per Edr. RURAL WORLD.—What you take for "small white worms," about ⅛ inch long, lying in the pith of a very small twig of the Delaware Grape-vine, "with small holes, looking as if they were partly grown over on the outside, by which they entered the cane," are not worms (or larvæ) but eggs. If you recollect, these supposed "worms" were not divided into many distinct joints or rings by transverse creases, but were smooth from one end to another like a sausage. By this character you may always distinguish the *eggs* of insects, (many other kinds of which are fully as elongate as those you send.) from the larvæ of insects. The eggs in question were deposited in the twig for safe-keeping last fall by the borer or ovipositor of the common Tree-cricket (*Œcanthus niveus.*) of which insect you will find a figure in the last number of the PRACTICAL ENTOMOLOGIST, (p, 54,) and also a notice of its habits; and if you had not meddled with them, they would have hatched out next spring into minute larvæ, only differing from the perfect insect in size and in having no wings.

This answers your first question, what these supposed "worms" really are. As to the second question, how are you to keep them off your vines, my advice is not to make any such attempt, but to allow the insect to breed and multiply as fast as he pleases. HE IS YOUR FRIEND AND NOT YOUR ENEMY; for, as you will see from the Article already referred to, he feeds upon plant-lice; and I know from many Missouri correspondents, and Mr. Geo. Husman says the same thing, that plant-lice are rather more abundant than is agreeable on the grape-vines of your State.

J. H. Hunt, Ohio.—The little cases, containing minute 16-footed worms, which you found upon your bee-hives, are those of the larva of some small moth belonging to the *Tinea* family. From very similar, but rather larger cases, I bred long ago a small moth, which was described by the late Dr. Clemens, from specimens sent to him by me, as *Solenobia Walshella.* The moths that destroy our woollen clothes and our furs live in somewhat similar cases, while in the larva and pupa states. It was merely in search of a suitable place to pass the winter in that these worms of yours crawled upon your bee-hives. They can do no harm to the bees, as they feed upon some kind or other of vegetable matter. There is no coleopterous larva that lives in such cases as these; and besides, all coleopterous larvæ are either 6-legged, sometimes with a leg-like process at the tail, or else they have no legs at all. The specimens arrived in first-rate order.

☞ Answers to John Murphy, Edward Orton, F. T. Pember, Isaac Hicks, E. E. Sheldon and Dr. Benj. Norris, will be given in the next number.

NEW ENGLAND ON THE PRACTICAL ENTOMOLOGIST.—During their recent session the Massachusetts State Board of Agriculture passed the following resolutions :—

Resolved, That in the opinion of the Massachusetts State Board of Agriculture, the Entomological Society of Philadelphia, [now American Entomological Society,] by its researches and its publications, has exhibited a commendable desire to increase the amount of human knowledge.

Resolved, That we regard with great favor the endeavors of this society to disseminate in an available form a knowledge of this important branch of Natural History among Farmers and Pomologists, and we specially recommend their publications and their gratuitous labors to the favorable notice of the community.

ERRATA IN NO. 17.

Page 50, column 1, lines 15 and 14 from bottom, for "flea-beetle, (*Haltica*)" read "snout-beetle, (*Apion.*)"

Page 56, column 2, line 35—6, for "I, p. 10," read "II, p. 10."

NOTICE.

The *Southern Cultivator*, now in the twenty-fifth year of its existence, is published monthly in large octavo form at Athens, Georgia; terms *two dollars* a year, payable in advance. Each number contains about 32 pages of reading matter and nearly the same amount of advertisements, whence we infer that its circulation is pretty extensive. In the number before us we notice many excellent articles on the cultivation of Rice, Sugar, Tobacco and Cotton, and the editors are live men, and thoroughly posted in their business. Success to the *Cultivator*, and may all its subscribers follow the advice which it gives them, namely, to send us specimens of the bugs that trouble them, snugly packed in a little tin box, with a supply of their natural food, and accompanied by as full an account as possible of the manner in which the animal operates. Southern bugdom, in many departments, is as yet a new and untrodden field: and it is only by the practical man cooperating with the scientific man, that noxious insects can be effectually counterworked.

JUMPING TO CONCLUSIONS.

The Editor of the *Wisconsin Farmer*, (March 2, 1867,) has an article upon "THE Potato Bug," in which, from his evident ignorance of the fact that there are no less than five different kinds of Potato Bugs, he arrives at some most astounding results. Because, as he shows, potatoes were infested by bugs at Zanesville, Ohio, in 1858, and at the St. Croix Falls, Wisconsin, in 1857, he jumps to the conclusion that these bugs must necessarily have been the true Colorado Potato Bug, (*Doryphora 10-lineata.*) If he will only refer to the PRACTICAL ENTOMOLOGIST, (II, pp. 25—27,) he will find four different kinds of Potato Bugs figured and named, which have infested various districts east of the Mississippi river for time immemorial; and he adduces not one particle of proof, that the Ohio bugs of 1858 and the Wisconsin bugs of 1857, were not some one of these four kinds. I say "not one particle of proof," because I do not call such reasoning as the following, in any correct sense of the term, "proof." "It would seem from their rapid increase, their destructiveness to the potato, and their indifference to caustic applications, that they must have been the genuine *Doryphora 10-lineata* of Colorado."[*]

When WILL Agricultural Editors quit talking about "THE Potato Bug," "THE Borer," "THE Grub," "THE Maggot," &c., &c? One might as well assume that there is only one kind of Bird in the whole United States, and that because a roasted Turkey makes very good meat, therefore a stewed Turkey Buzzard would be equally palatable, and equally wholesome diet.

But the cream of the jest is, that the *Wisconsin Farmer* publishes a letter from Mr. Byers, the Editor of the *Denver News* (Colorado,) in which the aforesaid Editor suggests, that I may have mistaken the Colorado Potato Bug for the Colorado Grasshopper!! What would Mr. Byers say if I were to insinuate, that he might possibly not know the difference between a "quod" and a "composing-stick?"

B. D. W.

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[*] Since the above was in type, I have heard from the Editor of the *Ohio Farmer*, that the common Potato-bug in Ohio is the Striped Blister-beetle, (*Lytta vittata*, figured in the PRACTICAL ENTOMOLOGIST II, p. 26.) "This insect," as he correctly remarks, "is much narrower and thinner than your Ten-lined Beetle, (*Doryphora 10-lineata*,) a sample of which I received from Iowa two years ago."

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Contents of Vol. I, No. 2.—April, 1867.

The Moss-Animals, or Fresh Water Polyzoa, (*with a plate.*) By Alpheus Hyatt.
How Plants are Fertilized. By J. T. Rothrock.
Insects and their Allies, (*with illustrations.*) By A. S. Packard, M. D.
The American Silk Worm, (*with illustrations.*) By L. Trouvelot. Continued.
The Land Snails of New England, (*with illustrations.*) By E. S. Morse. Continued.
The Tarantula Killers of Texas, (*with a cut.*) By G. Lincecum, M. D.
Reviews.
Natural History Miscellany.
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PHILADELPHIA, APRIL, 1867.

THE COMMON CURCULIO AND ITS ALLIES.

There are at least three very distinct Snout-beetles, (*Curculio* family), which have been popularly confounded together by various persons in various parts of the country under the common name of "Curculio." Yet in the eyes of an Entomologist they differ from each other as widely, as do a Cow, a Sheep and a Goat, in the eyes of a farmer. As the habits of these three Snout-beetles differ considerably, and as they must consequently be attacked in somewhat different modes, and at somewhat different times, by the Fruit-grower, I propose in the following paragraphs to give a brief account of each. Two of the three I was the first to publish as destructive to fruit; and one of these—the Plum-gouger (*Anthonomus prunicida*)—I was the first to name and describe.

One reason why Fruit-growing is so profitable a business in the Pacific States, is that none of these insects, so far as is known at present, exist there, even in small numbers. Although in California the Blest, the Chinese immigrants have already erected their joss-houses, where they can worship Buddha without fear of interruption, yet no "Little Turk" has yet imprinted the crescent symbol of Mahometanism upon the Californian plums, and the Californian peaches. This, indeed, is only what, reasoning from analogy, we should be inclined to expect. For though many species, both of plants and animals, occur both in the Atlantic and in the Pacific States, yet, as a general rule, the plants and animals of the one region of country are more or less different from those of the other.

The Snout-beetles, as a Family, are distinguished from almost all other Beetles by the front part of the head being more or less prolonged into a snout, which, in some genera, is as fine as a hair, and in others about as wide as the head itself, and at the tip of which the jaws are placed. This snout, being part and parcel of the head, is consequently immovable, except along with the head; so that it cannot be confounded with the beak or proboscis of the true Bugs and the two-winged Flies, or with the tongue of the Butterflies and Moths. For in all these last the part that projects in front, inasmuch as it consists of the variously modified organs of the mouth, articulates with the head, and is plainly movable with reference to what may be called the Skull of the insect. With a very few exceptions, the Snout-beetles have all their six feet (tarsi) 4-jointed, with the last joint but one split into two lobes—characters which they have in common with the Boring-beetles (*Cerambyx* family) and most of the Leaf-beetles (*Chrysomela* family), and which effectually distinguish them from a few small groups of Beetles, which have true Snouts but do not have all their six feet 4-jointed. There are many hundred species of them found within the limits of the United States; but at present we will speak of three only.

THE TRUE "CURCULIO."

(*Conotrachelus nenuphar* Herbst.)

This insect may be distinguished from all other N. A. Snout-beetles by having on the middle of each of his wing-cases an elongate, knife-edged hump, which is black and shining, so as to resemble a piece of black sealing-wax. Behind these two humps there is usually placed a broad clay-yellow band, marked in the middle with white; but sometimes this entire band is white.

The female "Curculio" makes her appearance early in the season, and as soon as the young plums are a little larger than a hazel-nut. Alighting upon a plum, she then, with the minute jaws placed at the tip of her snout, proceeds to make the singular crescent-shaped slit in the skin of the fruit, which is characteristic of the species, and to which the popular name of "little Turk" refers. In this slit she excavates with the same instruments a hole such as a pin would make, to as great a depth as the length of her snout will allow, widening and enlarging it a little at the bottom so as to make it somewhat gourd-shaped. Depositing in the slit a single egg, she next proceeds to crowd it down with her snout, to the bottom of the hole, where the cavity is sufficiently large to avoid all danger of the flesh of the injured plum growing in upon and crushing the egg. She then repeats the same process upon other plums, or occasionally to the extent of three or four eggs upon the same plum, till her stock of eggs is exhausted. According to Dr. Trimble, who has dissected many of these insects, the greatest number of eggs ever found by him in a single female "Curculio" was twenty-five; (*Fruit Insects* p. 79;) so that certain calculations, which have been based upon the assumption, that each female "Curculio" lays about two hundred eggs, appear to be founded in error. After a few days' time, the egg deposited in the plum hatches out into a whitish, legless grub with a scaly head, which bores a tortuous path through the flesh of the plum, eating its way as it goes. Finally, after the lapse of several weeks, the plum falls to the ground, its natural growth having been checked by the workings of the grub, and gum having very generally exuded from the orifice of the original wound. The larva then bores its way out, having by this time reached its full growth, and penetrates into the ground a few inches beneath the surface, where, in a cavity hollowed out for that purpose, it changes into the pupa state, and at length, in three or four weeks' time, comes out in the form of the perfect Beetle.

But plums, though the natural food of this insect, and the only wild fruit upon which I have ever found it, are not the only fruit which it attacks in our Gardens and Orchards. Among our imported stone-fruits, it prefers the nectarine even to the plum, and it also attacks the apricot, the peach and the cherry. As some have doubted whether so small a fruit as a cherry, could raise the "Curculio" to its perfect state, it may be well to state here, that according to Dr. Harris "the so-called *cherry-worm*, which is very common in this fruit when gathered from the tree, produces at maturity the same Curculio as that of the plum" (*Inj. Ins.* p. 77); and Mr. S. S. Rathvon, of Pennsylvania, tells me that he has bred "curculio" from the cherry, in a glass jar half filled with earth. Of late years, the "Curculio" has also infested pip-fruit, more especially apples; pears and quinces being not very much to its taste. In every case, with the single exception of the cherry, the fruit containing the fully developed "Curculio" larva dies and falls prematurely to the ground. But where, as sometimes happens, especially in pip-fruit, the egg fails to hatch out, or the young larva perishes prematurely, there the fruit is not killed, but simply deformed and stunted, as may very often be seen in apples. Out of the choicest apples selected for exhibition at our State Fairs, a large proportion will be found, on close inspection, to be more or less blemished from this cause, being studded in places with brown more or less rotten spots, and unnatural hollows and protuberances. The utilitarian, perhaps, may object that, for practical purposes, such apples are none the worse; but somehow or other most people prefer apples with fair, smooth, rosy cheeks; and even in the matrimonial market, young ladies that are pitted with the small-pox are rather at a discount.

As with a great many other insects that go underground to assume the pupa state, the pupa is liable to perish, unless the earth in which it lies is kept moderately moist. Hence, as Dr. Trimble has shown, in clay soils which are subject to bake with long-continued drought, almost the entire crop of "curculios" sometimes perishes in very dry summers. This explains a fact which otherwise might seem unaccountable, namely, that in certain clayey localities a fair crop of plums may be obtained almost every year, without taking those precautions which, in moister soils, are absolutely necessary to secure a crop.

So far, we have traced the history of the "Curculio" from the egg to the perfect beetle. Some of these perfect beetles come out as early as the middle of July—some in August—some as late as the latter end of September. Hence, as it seemed incredible that a beetle coming out in July should live all through the winter, and until the next season's crop of plums were set, and as no one had as yet ascertained that any "Curculio" hybernated in the beetle state, Dr. Fitch and, in the earlier edition of his work, Dr. Harris, have suggested the hypothesis that the species is double-brooded; the second brood being supposed, from the analogy of a very distinct snout-beetle which attacks the plum in Europe (*Rhynchites cupreus*), to lay its eggs in the twigs of the infested trees, the larvæ proceeding from which eggs pass the winter in the twig, and afterwards produce the beetles that sting the fruit in the following summer. (*N. Y. Rep.* II. § 52, and *Inj. Ins.* edit. 1841, p. 68.) But, in the first place, there is no proof of any such fact; and, in the second place, I have already shown that Dr. Trimble actually found specimens of the "Curculio" hybernating under the shingles of a roof, in the chinks of stone walls, and under the bark of an apple-tree; (*Fruit Insects*, p. 99;) and since then I have been informed by Mr. Rathvon, that he has himself found specimens hybernating under the bark of the cherry and the wild cherry in the months of March and November. Dr. Harris has also recorded the fact, that he has "found these beetles as early as the 30th of March," (*Inj. Ins.* p. 75,) apparently in the latitude of Massachusetts —a fact which is quite irreconcilable with the hypothesis of their having come out from the pupa state at so early a date in so cold a climate, and evidently implies that they must have passed the winter in the perfect state, and been tempted, as often happens in such cases, by some peculiarly fine and warm day, to come forth temporarily from their winter quarters into the open air. The truth of the matter is, that most authors have been disposed to underrate the duration of insect life during the perfect or winged state, putting the average period at a few days or weeks, when perhaps a few months would be nearer the mark. There is little doubt now, in my mind, that the "Curculios" bred from the fruit of one year are the same individuals that puncture the fruit of the following year.

Almost all the Snout-beetles will fall suddenly to the ground, when they are alarmed; and almost all Leaf-beetles (*Chrysomela* family) have the same habit. But this is preeminently the case with our friend the "Curculio," because, in common with many other Snout-beetles, nature has so organized him, that he can fold back his snout between his front legs, curl up his legs under his belly, and thus, when he falls, leave no part liable to strike against any obstacle and be injured. In this posture a "Curculio" looks quite unlike a living and moving insect, and would be readily mistaken by the inexperienced eye for a dried bud accidentally knocked off the tree. But place him on the ground for a few minutes—remain perfectly motionless yourself—and watch the proceedings of the seeming dry bud. One after another you will perceive the legs, the snout and the antennæ, gradually displayed; and finally, if the day is hot and you have patience to wait long enough, you will see the "little Turk" open his wing-cases, expand his long wings, and fly off in the air to renew his depredations. People commonly supppose that "Curculios" do not or cannot fly. In reality, they do not fly as strongly and as readily as many other beetles. But Dr. Harris "frequently caught them flying," (*Inj. Ins.* p. 76), and both David Thomas and Dr. Trimble testify that they often fly in the warm part of the day. (Trimble's *Fruit Insects*, pp. 42—3.)

Having thus made ourselves acquainted with the natural history of the "Curculio," we can now apply understandingly the most approved methods for counter-working this little pest. These are reducible to two, the first being directed against the insect in the larva state, and the second against the insect in the perfect or beetle state.

1st. Gather up and destroy all the wormy fruit, as fast as it falls from the tree, and before the larva has had time to leave the fruit and retire underground. Thus you nip the evil in the bud. The cheapest and easiest and most "Western" method, is to allow a gang of hogs the range of the orchard—hogs being very fond of green fruit and not having any squeamish scruples about the worms contained in it. This is the practice adopted by Dr. Hull, of Alton, Illinois, one of the most successful plum-growers in the West. Sheep and cows will also eat green fruit; but then they will also browse upon the trees, and perhaps occasionally bark them. Where hogs are objectionable, either because other crops are grown under the same fence with the fruit-trees, or because the sense of propriety and neatness is offended by the habits of these animals, all that remains to be done is to hire that work done by human hands, which the hogs will do gratuitously and thank you for the chance. In any case, the work must be done systematically and regularly. It will be no earthly use to pick up and destroy the fallen fruit, *after the larva has left it and gone underground.*

Of course it will be understood, that by destroying the wormy fruit you do not diminish the crop of "curculios" for the current year, but only that for the ensuing year. And as "curculios" can and do fly, it will be seen that it is of the utmost importance that a whole neighborhood should cooperate in this plan. Otherwise a fruit-grower, who did not allow a single "Curculio" to come to maturity on his own premises, might be perpetually pestered with such as have been raised by his neighbors, flying in upon his fruit-trees, day after day and week after week. As cherries, unlike all other cultivated fruit, do not fall prematurely to the ground, when infested by the larva of the "Curculio," it is plain that in this particular case the above method can have no application. Hence, if cherry-trees are to be kept free from "Curculio," we must depend solely and entirely upon the following method.

2nd. Jar your trees regularly every day, catching and destroying all the "Curculios" that fall therefrom. But recollect that the tree must be *suddenly* jarred, not *slowly and gradually* shaken; for the wind shakes the boughs of every tree continually, and yet the "Curculios" do not fall to the ground in consequence. But how are we to catch the "little Turk," after he has fallen to the ground? The old method was to spread white sheets on the ground under the infested tree, and to pick up the insects by hand as they fall, and destroy them in any convenient manner. For this purpose, Dr. Trimble recommends a large square sheet to be prepared, with a straight strip of wood sewed along the whole length of one of its edges, by way of stretcher, and two shorter stretchers, each sewed to one half of the opposite edge, the sheet being slit from between these two short stretchers to its central point, to receive the trunk of the tree. By this means the sheet is more easily spread out, and the wind is prevented from roughing it up. But so long as the whole surface under the boughs of the infested tree is covered by white cloth, so that no "curculios" shall be likely to fall outside and escape observation, it is immaterial for the success of the process what fashion of cloth be adopted.

Where the tree is not very large, and a limb of an inch or two in diameter can be conveniently spared, it is a good plan to saw off such a limb so as to leave a short stump to strike with the mallet in the jarring process. Otherwise, if the trunk itself has to be struck, it becomes necessary to pad the mallet to prevent injuring the bark. Where trees are quite large, Dr. Trimble recommends that a common mop-stick be padded at the end and applied successively to the leading limbs, one after the other.

For those who grow fruit on a small scale, the above will probably be found the most practically useful method of fighting the "Curculio." But for extensive fruit-growers, Dr. Hull's "Curculio-catcher" will effect a great saving both in time and money, though like other labor-saving machinery it requires some little outlay of capital, and cannot conveniently be operated, except in an orchard where no other crop but fruit is attempted to be grown. I am indebted to Dr. Hull himself for the following description of this machine, which may be briefly characterized as a gigantic, inverted umbrella, mounted upon a gigantic wheel-barrow, with a quarter-blooded cross of one of the battering-rams used by the ancient Romans. It is the first authentic description which has as yet been published; though two or three years ago a figure and description of some such machine appeared in print, without giving a word of credit to the inventor, and so unskillfully modified that, as Dr. Hull informs me, it would have required horse-power to move it about the orchard. The liberality of the original inventor, in thus gratuitously making known to the world the practical results of his own long and laborious experiments, through the columns of the PRACTICAL ENTOMOLOGIST, cannot be too much commended. Under such circumstances, some men would try to monopolize the invention for their own pecuniary benefit—some would take out a patent for it, and peddle the Patent Right over every State in the Union—and perhaps not one out of a hundred would do as Dr. Hull has done.

To make a "Curculio-catcher," we first obtain a light wheel of about three feet diameter, the axle-tree of which should be about ten inches long. We next construct a pair of handles, similar to those of a common wheel-barrow, but much more depressed at the point designed to receive the bearings of the axle-tree, and extending forward of the wheel just far enough to admit a cross-beam to connect the two handles at this point. Directly in the rear of the wheel a second cross-beam is framed into the handles; and two feet further back a third. The two last named beams have framed to their under side a fourth piece, say two or three inches in diameter, which is placed centrally between and parallel with the handles.

To the handles and to these last-named pieces, our stretchers to support the canvas are to be fastened. The front part of the beam, connecting the handles before the wheel, is designed for a ram, and should be covered with leather and stuffed with furniture moss, a dozen or more thicknesses of woollen cloth, or other soft substance; care being taken to use no more than is sufficient to protect the tree from bruising. The frame of our Catcher being finished, we next ascertain the elevation the handles should have in driving, and support them in that position. Having ready twelve stretchers or arms, (six for each side,) which are to receive and support the canvas, we place the long front arms in position. These extend from near the centre of the wheel on each side, and beyond the wheel in front about six feet; and are wide enough apart to receive the largest tree between them, on which it is intended to operate. The remaining stretchers are supported on the handles, and attached to the three cross and parallel pieces in the rear of the wheel. These are so placed as to divide the space at their outer ends equally, between the first-mentioned stretchers and the ends of the handles.

We now have ready a strip of board, one-half inch in thickness and two and a half wide. One end of this is firmly secured to the forward end of one of the front stretchers; it is then secured to the end of the next, and in like manner to all the others on one side of the machine, and fastened to the handle. Both sides are made alike. The office of these two strips is to hold the outside ends of the stretchers in their proper position, and prevent the two front stretchers from closing. These outside strips also receive the outside edge of the canvas, which is fastened to them, as well as to the several arm supports. Three of these arms, on each side, may be cut and hinged so as to fold up, thus making the machine more convenient for housing. In this case two additional sets of braces would be required, and each of the outside rims would be made in three parts, instead of one, as first described.

From the description thus far given, it will be seen that the wheel occupies a central position, and is nearly in the centre of the machine. To avoid an opening at this point, a frame is fastened to the handles on either side of it, and brought together over the top of the wheel. This, as well as the stretchers, is to be covered with canvas. The arms or stretchers are so curved, that the jarring motion in moving from one tree to another brings everything falling on the canvas to the most depressed points, where openings are made into tunnels, to the ends of which the mouths of pockets or sacks are tied. These can be removed from time to time, and their contents destroyed by immersion in hot water. The whole machine, when completed, is about 10 feet in breadth by 11 or 11½ long; or at most 11½ wide by 13 or 13½ feet long. These are for large orchard trees. Smaller trees could be protected with a smaller machine. The frame-work, when covered, should be so nicely balanced, as to require scarcely any lifting to hold it at the proper elevation.

The mode in which the "Curculio-catcher" is operated, is thus graphically described by its inventor:—"The machine is run suddenly against the tree three or four times, with sufficient force to impart a slight jarring motion to all its parts. The operator then backs far enough to bring the machine to the centre of the space between the rows, turns round, and in like manner strikes or butts the tree in the opposite row, and so on to the end of the orchard. In this way a man may operate on two or three hundred trees per hour. The captured insects may either be scalded, as recommended above, or drowned by an immersion for several days in cold water." It may be added here, that the "Curculio" prefers the nectarine, the plum, and other smooth-skinned stone-fruit, to such as have downy skins like the peach. Taking advantage of this propensity, Dr. Hull, according to the report of his speech at a Meeting of Pennsylvania Fruit-growers, published in the *Iowa Homestead*, (Dec. 19, 1866,) sometimes "plants plums and peaches in alternating rows; and as the Curculio does not resort to the peach as long as the plum is at hand, he saves both, by killing them on the plum."

The assertion is often made, that there is no effectual remedy for the Curculio, and that jarring on sheets does not save the crop. Neither does it, unless it be systematically and pertinaciously followed up. But that this insect may be subdued by patient perseverance in the jarring system, there is the best and fullest evidence from practical men. Dr. Trimble, who for twelve years owned large Orchards both of Plum and Apricot-trees, declares that it is so. Ellwanger and Barry, the celebrated nurserymen, of Rochester, New York, keep two men constantly employed during the Curculio season in jarring their trees, and thus grow magnificent crops of plums. Mr. Lucius C. Francis, of Springfield, Illinois, wrote me word long ago, that he raised good crops of plums from an orchard of about a hundred bearing trees, merely by jarring them upon sheets some two or three times a week. And finally Dr. Hull, of Alton, Illinois, grows whole acres of the most superb plums, and slaughters the Curculio wholesale, and at railroad velocity, with his murderous machine.

All the other proposed remedies are mere moonshine, or at all events have not yet been fully tested. You can diminish next year's crop of Curculio, by destroying the wormy fruit as it falls; but when the Curculio is already upon you, destroying your fruit day after day, you can only subdue him with certainty by the jarring process. Those who desire to see a whole string of supposed remedies against the Curculio catalogued and refuted, can read Dr. Trimble's book. I will only add here, that a writer in the *Country Gentleman* (April 19, 1866) recommends fencing out this insect from growing fruit, by surrounding the but of the tree with a bandage covered with some sticky kind of paint, because, as he observes, "it is said that the female curculio cannot fly, but crawls up the tree, and when she attempts to pass over the paint she becomes impaled there and perishes." He might just as well recommend building a tight board fence round every corn-field, to fence out the crows and the blackbirds. For, as has been already shown, both male and female curculios can and do fly as well as any bird, during the warm part of the day.

There is, however, one other mode of fighting the Curculio, which is recommended on such high authority, that it must not be omitted here, although I confess to a little skepticism as to its being as universally reliable as is represented. It will be found in the following communication to this Journal, from the pen of Mr. N. W. Bliss, the Secretary of the Warsaw (Ill.) Horticultural Society.

> During the season of 1856, Mr. Jas. B. Matthews, now of Marietta, O., had six or eight Chickasaw plums of extra quality, growing in a cluster in his garden, in Warsaw. On ⅓ of these he began throwing air-slacked lime, as soon as the fruit set, and continued it after every rain, and sometimes after a heavy dew, showering the trees till they were white with the fine dust. On one or two trees he used none at all; and on the remainder he commenced using the lime after the Curculio had attacked the fruit. The lime dust was applied as often as once a week. Result—not one plum on those trees on which he did not use lime—a full crop of good fruit on those on which he commenced using lime early—and on those on which the Curculios had begun their attack before he began to apply the lime, he drove them entirely away and saved a portion of the crop. I followed the same plan, and saved so many plums as to break down my trees, as I was absent from home, and so did not have a chance to thin out the fruit, though I had the lime applied faithfully while I was away.

The following from that distinguished Horticulturist, F. K. Phoenix, of Bloomington, Ill., is to the same effect, so far as it goes. But we should observe that in the case recorded by this gentleman, the remedy was only tested on one single tree for two successive years, and in Mr. Matthews's case only on a few trees for a single year. Unfortunately, Mr. Bliss has forgotten to tell us, upon how many trees he himself experimented or whether he continued the application of lime for more than one season.

> A neighbor amateur has this year grown about a bushel of most delicious Imperial Gage Plums on one tree, passed to him some three years since by a brother, who said, "No use for him to try to grow plums!" After it was planted out one year, the family wood-pile was corded up under and about it, and after the fruit had set, and so long as any fears of Curculio were entertained. a plentiful supply of air-slacked lime dust was scattered over the top every week. Last year it had a peck, and this year a bushel or so, and here you have the whole story.—From the *Horticulturist.*

Where the Curculio has already deposited its egg in any particular fruit, that fruit may be saved without any material damage, by cutting out the egg or the very young larva with a penknife or any other convenient tool. It is found that the wound soon heals over and leaves but a slight scar behind. But this is too slow and troublesome a process to adopt, except where young trees are fruiting for the first time, and it is desirable to test the quality of the fruit at any expense of time and labor.

It may interest some to know, that although they have a snout-beetle in Europe which attacks plums somewhat after the fashion of our "Little Turk," yet, according to Mr. Glover, he saw no insect, in his recent visit to the Entomological Convention in France, "which approximated our plum weevil in either numbers, manner of attack, or destructiveness." (*Agric. Rep.* 1865, p. 90.) Mr. Stainton, however, states that the larva of a minute moth—the *Opadia funebrana* of Treitschke—"feeds in the interior of plums [in England], and is very common, as those who are in the habit of preserving plums well know." (*Entom. Ann.* 1855, p. 54.) But as Mr. Stainton says that he only has two specimens of this moth, "and believes that a few others have been since met with," the word "common" seems to be used here in its entomological and not in its popular sense.

THE PLUM GOUGER.—*Anthonomus prunicida* Walsh.

This insect has nearly the same habits as the common "Curculio," and in northern and central Illinois is at least equally common, being often found in company with it on the same tree, and appearing and disappearing at about the same time of the year. Many have confounded it with the "Curculio," and one fruit-grower informed me that he had noticed it on his plum-trees, but had always supposed it to be the male of the "Curculio"—which it most certainly is not. In two remarkable respects, it differs in its habits from the "Curculio." 1st. It bores, not a crescent-shaped slit, but a round hole like the puncture of a pin wherein to deposit its egg, as many as five or six such holes being often met with on a single plum, with the gum copiously exuding from each. 2nd. The young larva hatched out from the egg, instead of living permanently in the flesh of the fruit, bores its way in to the kernel, and thereafter devours the substance of that kernel exclusively.—Occasionally, at all events, and probably as a general rule, the larva of this snout-beetle, instead of going underground to transform into the pupa state, as that of the common "Curculio" almost always does, transforms inside the stone of the fruit which it inhabits, the perfect beetle emerging as usual, through a round hole which the larva had previously cut for that express purpose. As fruits infested by this insect fall prematurely to the ground, just as when they are infested by the "Curculio," this peculiarity gives the fruit-grower a better chance to check the multiplication of the species. In the one case, fallen fruit must be destroyed almost immediately, to work any benefit; in the other case, it may lie undisturbed on the ground for some weeks without its making any difference.

The thorax of the "Plum-gouger" is ochre-yellow; the head and hinder parts slate-color, the latter with irregular white and black spots. In common with the other species of the genus to which it belongs, its snout usually projects forwards, or at the most, is bent perpendicularly downwards; whereas that of the "Curculio" usually hangs perpendicularly downwards, like the trunk of an elephant, but is capable, as before stated, of being folded backwards between its front legs. The Plum-gouger is further distinguishable from the "Curculio" by its wing-cases being smooth and dull-colored, without any shining glossy humps on them.

Dr. Hull writes me word that this insect is an old acquaintance of his, but that it is not anything like as common near Alton, Illinois, as the "Curculio"—occurring, as he estimates from the insects captured in jarring his plum-trees, only in the proportion of about 1 to 50. Near Rock Island, in Northern Illinois, it is certainly to the full as common as the "Curculio," both on tame and on wild plum-trees. In Central Illinois it is also about equally common, both at Springfield, according to Mr. Francis, and near Bloomington, in the Orchards of Dr. Schroeder and Mr. Wm. Holmes. It has also occurred near Crescent City, Iowa, on the plum-trees of Mr. H. A. Terry. So far as is at present known, the insect is peculiar to the Valley of the Mississippi, and has not been met with in the Atlantic States. Dr. Hull remarks to me, that "it appears to be especially fond of the Smith's Orleans Plum, though other plums are also attacked by it, the yellow or green-skinned sorts the least."

As we should naturally anticipate, from the fact that this insect is physically incapable of folding up his snout and his legs into so compact a mass as the "Curculio" does, he does not drop to the ground quite so readily as the "Curculio." According to Dr. Hull, "it requires severe jarring to bring him down." Possibly, one reason why this gentleman found proportionally much fewer "plum-gougers" on his Plum-trees, than other fruit-growers have done in other parts of Illinois, is, that a larger percentage of the "Curculio" are dislodged by his "Curculio-catcher" than of the "Plum-gouger." Of course, where each separate limb of a large Plum-tree is successively jarred by a padded mop-stick or other such instrument, a Snout-beetle, that does not drop very freely and readily, will be more likely to come down, than where the trunk of the tree only is butted or jarred, as is the case when the "Curculio-catcher" is used.

THE FOUR-HUMPED CURCULIO.

(*Anthonomus 4-gibbus*, Say.)

This insect was named and described long ago by Say, as common everywhere in the United States. It is of a dull-brown color, shading into rust-red behind, and may be readily distinguished by the four projecting humps on its wing-cases, none of which, however, are shining black, as in the case of the common "Curculio." The males have considerably shorter snouts than the females, which is also the case with a genus of Snout-beetles (*Balaninus*), with long snouts as fine as a horse-hair, which infest the acorn and the hazel nut.

Speaking of this insect in the *Prairie Farmer* of July 18, 1863, I stated that "I had always found it on the crab and the hawthorn, and that, perhaps, it may sooner or later attack the apple." In the very next year I received many specimens from Mr. Wm. Cutter, nurseryman, of Beverly, Illinois, together with some of the apples punctured by it, and the following account of its operations:—

> The first we noticed of them was on the 26th of May, when they had marked but little of the fruit. To-day (June 12th) they have punctured full one-half of it, on trees of ours that promised ten to fifteen bushels this year. On the lower limbs, hardly an apple has escaped them, many having eight or ten holes in them; but on the top branches there is scarcely a single apple touched. To-day, it was no trouble to find ten or twelve of them by looking over the trees; so we tried shaking them on to a sheet, but found it impossible to jar them off. Full one-half of those we find have their long snouts plunged deep into the fruit—and we have noticed six on a single tree. The holes they make are perfectly round, and appear to be made for the purpose of eating, as we can see no eggs in them. There are no crescent-shaped marks on the apples, such as those made by the Little Turk, and our apple-trees seem to be entirely clear of all Turks and Gougers, except this one sort. We think we see some signs of their work on pears—but cherries, and what few peaches we have, are not touched by them."

Having, by way of experiment, gathered thirty or forty crabs that had been perforated by this same insect, I found that fully three-quarters of the holes contained neither eggs nor larvæ; in eight of the holes I found an egg; and in three of them young larvæ recently hatched out. Whence it results that most of these holes are bored, as Mr. Cutter suggests, "for the purpose of eating," and that eggs are deposited only in a few of them. The Plum-gouger seems to have the same habit; for Dr. Hull has found as many as 40 or 50 punctures on a single Smith's Orleans plum, and yet very seldom finds more than one egg in one plum.

Having sent a specimen of this "Four-humped Curculio" to Dr. Hull, (as well as of my "Plum-gouger,") and inquired whether the species infested apples near Alton, I received the following reply:—

> So numerous are they, that I do not recollect to have seen a single apple the past season, grown at this point, that did not contain from one to twenty or more punctures made by this insect. He appears to vie with the Plum Curculio in rendering apples of as little account as possible.

I have never traced this insect through its transformations, and do not know how long the larva remains in the infested fruit—whether it retires underground to transform or transforms within the apple—or whether the perfect beetle makes its appearance the same season or in the following spring. Neither do I know whether apples containing these larvæ fall prematurely from the tree. Mr. Cutter observes, that he found it impossible to jar these snout-beetles off the tree on to the sheets. I have always myself succeeded in dislodging any number of them from crab and thorn trees, by beating the boughs into an inverted umbrella. But no doubt, as it belongs to the same genus, and has the same structural peculiarities as the Plum-gouger, it will require equally severe jarring to bring it to the ground. Whether it can be effectually counterworked in any other manner, can only be told after we become more fully acquainted with its habits.

There are several other snout-beetles which infest fruit-trees, either cultivated or wild; but their history and habits yet remain to be fully investigated, and I hope to be able to devote some considerable attention to this subject during the coming season. Mr. H. A. Terry, of Iowa, reports the *Epicærus imbricatus* of Say, "as doing great injury to the apple and cherry-trees, as well as gooseberry bushes;" but whether it operates upon the twigs, the buds, the leaves or the fruit, has been left uncertain to the present day. (See the *Prairie Farmer* of July 18, 1863.) From the analogy of certain allied European species, we may infer that it merely devours the leaves, and lets the fruit and the twigs alone. The New York Weevil (*Ithycerus noveboracensis*)—a gray species fully ½ inch long—is likewise sometimes very injurious in nurseries in the Western States, by gnawing off and destroying the buds and the twigs of young apple-trees. I have also received from Mr. Francis, of Central Illinois, two other snout-beetles, (*Conotrachelus puncticollis* Walsh and *Balaninus robustus* Walsh MS.,) as jarred off his plum-trees, in company with the common "Curculio" and the Plum-gouger. It is not improbable, therefore, that both these two insects occasionally, at all events, deposit their eggs in plums, in some such way as the "Curculio." But whether these two last be identical with two Snout-beetles which Dr. Hull finds on his plum-trees, and of which he has promised me specimens, remains to be proved. As two other Snout-beetles (*Conotrachelus cratægi* Walsh and *C. posticatus* Schönherr) are known by me to breed in the wild haw, it is not impossible that they may also occasionally attack the apple.

As to the three Curculios which I have described in the preceding paragraphs, they may be readily distinguished, one from the other, in the following manner:—The common "Curculio" has a snout which hangs down like the trunk of an elephant, and which he can, whenever he chooses, fold backwards between his legs, although he has no power to project it straight forwards. On the other hand, the Plum-gouger and the Four-humped Curculio usually carry their snouts projected horizontally or nearly so, in front of them; but upon occasion can depress them vertically, although they have no power to fold them backwards between their legs. Of these two, thus agreeing as to the structure of their snouts, the Plum-gouger is at once distinguishable by having a smooth back, without any humps on it, whereas the Four-humped Curculio, as its name indicates, has two very conspicuous humps on each of his wing-cases. As regards their habits, the common Curculio infests stone-fruit more especially, but not unfrequently has been known to attack pip-fruit; while, so far as is at present known, the Plum-gouger is exclusively confined to stone-fruit, and the Four-humped Curculio to pip-fruit.

B. D. W.

THE IMPORTED APPLE-TREE BARK-LOUSE.

(*Aspidiotus conchiformis.*)

From the *Prairie Farmer*. By C. V. Riley.

That this insect is not exterminated, is not for want of advertised cures; for the number of sham, empirical remedies—patented of course—that are now circulating through the country, and whose owners are wheedling the farmers into purchasing, is truly astonishing. Here Mr. Michael O'Sullivan of Rochester, Wis., scatters to the winds his circular, headed "Bark-louse Exterminator," with a liberality that is praise-worthy indeed, considering the high price of paper. He announces the fact that he has obtained from the patent-office, a patent for a compound which is a sure remedy alike for the Bark-louse, Borer and Canker-worm. It is to be introduced into a hole bored above one of the main roots of the tree, by means of a tin tube, rammed home, plugged tight, and covered up with the soil; and it kills the bark-louse in eight months, the borer in two, and the canker-worm in from forty-eight hours to five days.

As an illustration of how well such men are qualified to provide proper remedies for insects, a Mr. Allen of Mt. Morris, Ill., who has been canvassing Lee and adjacent counties with another bark-louse remedy, on being asked by A. R. Whitney, of Franklin Grove nurseries, what he knew of the insect's history, responded, that he didn't know how they first came on the trees, but supposed they became winged and flew off—that there was one animal under each scale, which scale, he had but little doubt, grew in the same manner as does the shell of a snail. Mr. Allen's remedy, however, is more rational than that of his competitor, being a wash for the bark, the principal ingredient of which is turpentine, if I am well informed.

That men are constantly being imposed upon by these sharpers is not to be wondered at, for insects are very generally despised creatures—their consequence being rated by their size—and there is great ignorance of Entomology even among the most intelligent. Take as an instance the last number of our new "American Journal of Horticulture," where, under the head of "Apple Culture—the Aphis," Alexander Hyde makes some very general and excellent remarks on the Bark-louse. The Aphis and Bark-louse are two very different insects, and yet they are there confounded, and the value of the article marred by the mere misapplication of a scientific term. As no comments are made by the editor, this statement might be doubted, but the insect in question is distinctly termed "*Aphis mali*" on p. 165, 4th line; and a little lower down the author says, "If, in the latter part of May, we carefully raise the body of the Aphis, we can discover numerous eggs," etc. Still further on he continues:

"The female, after laying her eggs, dies; but the outer skin remains as a protection to the eggs. When first hatched, the young have some motion, and disperse themselves over the tree. While in the larva state, the young lice grow rapidly, and must greatly exhaust the trees by drawing from them the nourishment necessary for their growth. In a few days they pass into the pupa or chrysalis state, and the females become fixed, never changing their location after they have once become stationary, and seem merely a rough excrescence on the bark."

Now these descriptions accord in every respect with our bark-lice, but the writer never saw the eggs of the *Aphis mali* under the female in May, nor is she the exact color of the tree, nor does she ever become fixed, except when preyed upon by a parasite. She in fact produces her young—of which there are several generations in a year—alive, without any aid from the males, as these only make their appearance at the approach of winter. After the females have coupled, however, they produce small, shiny, black eggs, which they secure in the crevices of the bark; and if the tree be smooth and infested with the borer, the cracks at the mouth of its burrow may always be found lined with these minute eggs.

Remarks by B. D. W.—Incredible as it may seem, Mr. Riley's criticism on the *American Journal of Horticulture* is based upon actual facts. The writer in that Periodical absolutely does not know the difference between a Bark-louse (*Coccus* family) and a Plant-louse (*Aphis* family), and mixes up the names and the habits of the two in a most amusing, though certainly not a very instructive gallimaufry. The best idea that the reader can obtain of this astounding article, is by supposing some Agricultural Journal, recently started in Boston, and claiming "to supply a demand that has been long felt," to discourse as follows about Sheep:—

> The Sheep (*Sus scrofa*) is the most useful animal that has been domesticated by man, inasmuch as it supplies him not only with Bacon, Tallow, Pickled Pork, Mutton and Lard, but furnishes all the wool that is worked up into clothing by the Manufacturers of New England. Though its flesh is so palatable, yet the sheep is a very foul-feeding animal, greedily devouring any kind of putrid carrion, and readily eating almost anything that any other creature will eat, except hay, straw and white beans. It has a remarkable propensity for wallowing in the foulest mud-holes, so as to daub itself all over with mud, which, after it has become thoroughly worked into the fleece, the sheep men call by the technical name of "oil" or "yolk." Taking advantage of this nasty habit of the Sheep, the sheep men supply their flocks with abundance of wallowing holes; for this "oil," as they call it, is always sold along with the fleece at the same price per pound, although it must all be washed out before the wool can be spun and wove into cloth, and thus becomes a dead loss to the unfortunate Yankee manufacturer. Frequently the fleece of an improved Chester White Buck, worth $3,000 after he has taken the First Prize at some Agricultural Fair, weighs when marketed 25 pounds, only 3 or 4 pounds of which is clean wool, the rest being nothing but mud, or the so-called "oil," which the poor wool-buyer is compelled to pay for at the same rate as the wool. Formerly the Berkshire sheep were the most highly esteemed; but they are objected to now on account of the generally dark color of their fleeces; and the Chester Whites, Infantados, Suffolks, Vermont Merinos and Irish Graziers, are at present the most popular breeds.

The author of the above Entomological Article in the *American Journal of Horticulture*, figures twice over in the list of its regular Contributors, once in the department of "Vegetables and Cereals" and once in that of "Pomology." The *Journal* advertises two regular Entomological contributors—Mr. Scudder and Mr. Sanborn—either one of whom would have been utterly incapable of such ridiculous blunders as the above. Why not employ one of these gentlemen to write about Plant-lice, and confine Mr. Alex. Hyde to his Plums and Potatoes? What is the use of a "Journal of high tone and liberal ideas employing the best talent in America," if it sets Fruit-men to write about Bugs and Bug-men to write about Fruit? If this is the best the *Journal* can do, it will be some time before it attains that circulation of 40,000, which it so confidently anticipates in its advertisements. Horticulturists want a Magazine from which they can learn something, and not a farrago of articles written by men, who know nothing at all of the subjects which they discuss, and who thus pile error upon error and blunder upon blunder, till confusion becomes worse confounded, and the primeval chaos returns again, and all the fruits of Adam's labors, in naming and distinguishing the different species of animals created by the Almighty, are lost, and, for the time being, annihilated.

In the Introduction to the first number of the *Journal*, the Editor promises that "Entomology, as connected with horticulture, shall be treated by competent writers." (p. 3.) It appears then, that, in the judgment of the Editor, a man is a competent entomologist who does not know the difference between a Plant-louse and a Bark-louse!! I am confident that not one of the excellent, long-established Horticultural periodicals, which are sneered at in the same page of the Introduction, as "having an interest in some horticultural establishment," would ever make such a laughable mistake.

CONFESSING THE CORN.

In the last number of the Practical Entomologist, (p. 58), I taxed the *Prairie Farmer* with two mistakes, 1st, attributing an Article to Mr. Glover, which on the face of it was written by another man, and 2d, accusing the author of the Article of calling the Striped Borer of the apple-tree a butterfly, instead of a beetle. The *Prairie Farmer*, as it appears, had already pleaded guilty to the first charge, before my paragraph was published; and I now beg leave to "confess the corn" as to the second charge. The author of the Article in question does actually call the Striped Borer a "butterfly," having only 16 lines before called it a "beetle." The word "butterfly" does not, however, occur on the *eighteenth* line of p. 205, as the *Prairie Farmer* of March 16, 1867, erroneously asserts; but part of it on the *nineteenth* line, and part of it on the *twentieth* line. We shall all of us get right at last on these important matters.

B. D. W.

THE PROPELLER FLY.

The following description of a new species of Fly, is from the pen of Captain Kingsbury, of the 14th Illinois Infantry. Probably it comes as near the truth as the descriptions of some of our modern "species-grinders." In other words, there is a very large superstructure of fancy, built upon a very slender foundation of facts. The insect is said to have occurred near Corinth, Mississippi; but it would puzzle Loew to decide to what family of Diptera it properly belongs.

> Within the last week I have discovered a new kind of insect—I call it the Propeller Fly. It is not as large as one of our Yankee musquitoes, but you ought to see and feel them bite. They light on you, raise their hind end—standing on their fore legs—and commence turning around. Their bill is like a corkscrew, and when they get it in the right place they start the machinery by advancing the right fore leg. They then work a propeller wheel, which is, of course, at the stern, and around they go like lightning, and in goes the corkscrew, and you cannot pull them off without unscrewing them. They are a "bad egg."

☞ We want 5000 more subscribers to the *Practical Entomologist*. Will not each present subscriber try to send us another?

ANSWERS TO CORRESPONDENTS.

Dr. James Weed, Iowa.—The "small white worms," taken in company with the angle worms, out of the earth of flower-pots, in which plants were growing, are, as you rightly suppose, the young of the latter. If they occur in the earth of the flower-pots in anything like the numbers found in the earth you send, they must certainly be injurious to the plants. I should recommend re-potting the plants with fresh earth, free from these gentry. It is said that brine will kill them; but if made too strong, it would kill the plants at the same time. Angle-worms are of the hermaphrodite sex, though they unite for mutual impregnation; and consequently a single impregnated individual introduced into a flower-pot can propagate indefinitely, so long as the conditions of life are favorable. They could not be introduced in cistern water. There are tolerably well authenticated cases of small fish having been taken up by water-spouts and "rained down" upon the earth; but I do not believe that any water-spout or whirlwind could dig up angle-worms out of the solid earth, and after carrying them through the air rain them down upon the roof of a house, so that they would finally find their way into the cistern.

J. W., Iowa.—The canker-worm moths which you sent, and on which, by the way, I had to pay express charges, were absolutely worthless as specimens. Of course, if you put two or three dozen living moths loose in a half pint bottle, they will flutter every feather off their wings before they have travelled a mile. The specimen with short wings is a male, whose wings, as often happens with moths, have failed to expand properly on coming out of the pupa. Such specimens are technically said to be "crippled."

Huron Burt, Missouri.—The larvæ of which you turned up so many bunches in working over your asparagus bed arrived in excellent order, owing to having been packed in moist earth, in a little tin box. They produce the same two-winged fly, (*Bibio albipennis*), the larva of which I recently spoke of in the Practical Entomologist, (II p. 45), as having been found by a New England naturalist to be largely preyed on by the Robin. They feed exclusively on dead vegetable substances in a moist and decaying state, and are not very particular as to what that substance may be. Years ago I had a parcel of them feeding on damp leaves in a glass vase, and, on putting several dozen of our common "Oak-Apples" into the vase, I was surprised to find that they, most of them, quitted the leaves and burrowed into the Oak-Apples. I have always found them as you did—in large crowds together. They should not be destroyed, as they do no harm either in the larva or in the fly state. In this wide, wide world there is room enough both for flies and for men; and although we are justified in taking life for good and sufficient reasons, yet we should not do so wantonly.

L. West, Ohio.—The lice "found on the neck and some other parts of the body of a horse, but not very numerous, though there were eggs or nits in abundance" are not true lice (*Pediculus* family), but belong to the Bird-lice (*Nirmus* family). The latter have complete jaws, and are Biters (*Mandibulata*); the former have nothing but a beak to suck with, like the various species of True Bugs, (*Heteroptera*), and are Suckers (*Haustellata*). This is all I can tell you about them, as I have never paid any special attention to this department of Entomology, and do not know of any one in America that has. Most probably, as the horse is an imported animal, not indigenous in America, these lice of yours have been imported along with him, and are well known in Europe; but I do not possess the works of those European authors who have written specially upon this subject. Undoubtedly, lice of any kind are injurious to any animal, if they are allowed to increase to any very excessive numbers. To get rid of them in your case, I should recommend kerosene to be *sparingly* applied to the parts infested by nits. But it would be dangerous to apply kerosene freely over the whole surface of a horse's body. Tobacco-water would also destroy them, but must be applied with still greater caution than kerosene.

A. A. Baker, N. J.—The cocoon sent, which you found suspended from a twig of Wild Cherry, is, I believe, that of *Attacus Promethea*—a large moth expanding some four inches, and the male of which is remarkable for being colored so differently from the female, that at first sight it would be taken for a distinct species. The species is not destructive to fruit trees, and is more usually found on Sassafras.

J. H. Hunt, Ohio.—You say that you have examined, under the microscope, the case-bearing lepidopterous larvæ, noticed in my answer to you last month, (p. 75), and that they are not 16-footed, but 6-footed. Lepidopterous larvæ, as you are probably aware, usually have only six true jointed legs in front, and behind a certain number of fleshy pro-legs (or shamlegs) varying from four to ten. In certain genera that mine the leaves of plants, both the legs and the pro-legs are reduced to nothing, and in many of these case-bearing genera the pro-legs are so indistinct, that they are only perceptible when the creature walks, being represented merely by a slight protuberance. You sent so few specimens that, being desirous to breed the moth from them, I did not before, and I do not now, desire to sacrifice an individual by extracting it out of its case. Likely enough you may be right as to the indistinctness of the pro-legs. By the way, in saying that "no coleopterous larva lived in such cases as these," I should have mentioned that the leaf-feeding coleopterous genera *Cryptocephalus*, *Chlamys* and their allies inhabit in the larva state somewhat similar, though much shorter cases. There can be no doubt, however, that your cases will produce minute moths and not beetles, judging from the lepidopterous character of their structure and that of the larvæ which they contain.

J. Pettit, C. W.—The strong smelling Carabide is *Haplochile pygmæa* Dej.

Jas. H. Parsons, N. Y.—The "thousand-legged worms" of which you sent many dozen specimens dug up in your garden, and which you suppose to be the same as those you saw last year eating dead seeds (beans, peanuts, &c.), are the *Iulus virgatus* of Wood. They differ from the species I described (Practical Entomologist, II, p. 34), in having 7-jointed (not 6-jointed) antennæ, and in having a conspicuous black line along the whole length of the back. The flatter "thousand-legged worms," of which you sent only a few, and which you think is the species that attacked your onions last year, is the *Polydesmus serratus* of Wood, and is very closely allied to the species which Dr. Fitch ascertained to prey on living vegetables, (*Polydesmus canadensis*). The specimens sent are only half-grown, (⅓-inch instead of ¾-inch), which is the reason of their being much paler colored than those you saw last year. The "two yellow worms" are, as you suppose, true wireworms, and would have changed, if permitted to live, into some kind of Click-beetle. The two cocoons, one ¼-inch, the other ⅛-inch long," are the pupa-cases of some two-winged fly of the great *Musca* family, and probably those of your common Onion-fly (*Anthomyia ceparum*). The "greenish globular bodies" which you suppose to be eggs, I cannot identify. As to the "single specimen of a thousand-legged worm 2 inches long," it must have furnished a meal to its brethren on the road; for there was not a vestige of it in the box.

F. C. Hill, Ohio.—I will candidly confess my mistake in saying that our American toads do not leap, (Practical Entomologist, II, 57), I must have been thinking, as you suggest, of the European species, which have not that faculty. Still, I never saw even our go-ahead American toads leap more than a few inches at a time, while frogs often clear several yards at a single jump. I never saw toads eat strawberries myself; but Dr. Trimble says that they will, and he is a decided friend to this poor maligned animal, (*Fruit Insects*, p. 74). The "glorified squash-bug, about ¼ inch long, with a crest on his thorax," which, as you say, sometimes inflicts a severe puncture with his beak, must be the *Prionotus novenarius* of Say. I have received it from Pennsylvania, but was not previously aware that it occurred in the Northwestern States. Say states that "its puncture is very painful, benumbing the vicinity of the wounded part for a considerable time." But with all these species that pierce you with their beak, it is the easiest thing in the world to hold them in such a way that you cannot be attacked by them. All that you have to do is to grasp them *laterally* by the breast between your thumb and finger; and so long as you do not relax your hold, you are perfectly safe.

John H. Tice, Missouri.—The woody blood-brown gall, about four inches long and one inch in diameter, on the cane of the Blackberry, is the work of the *Diastrophus nebulosus* of Osten Sacken. (You will find descriptions both of the gall and of the insect in the *Proceedings, &c.*, II. p. 36.) This insect is a four-winged fly, belonging to the *Cynips* family in the Order Hymenoptera; and the genus *Diastrophus* is confined to the Blackberry, as *Rhodites* is to the Rose, and *Cynips* to the Oak—all these genera belonging to the same family. Formerly entomologists used to refer at hap-hazard any gall that they knew nothing about to *Cynips;* and I believe I was the first to clearly point out, that *Cynips* is confined to the Oak, and that, as a general rule, each genus of Gall-making insects is confined to a particular genus of plants. Of course, your horticultural friends are mistaken in supposing, that this Blackberry gall contains the larva of the Curculio. You will breed from it a Guest-fly that sponges upon the poor, honest makers of the gall, for board and lodging, and resembles them very closely, though it belongs to a very distinct genus of the same family; and also several true Parasites that prey on the bodies of the Gall-making larvæ. But in all probability you will not breed from it a single Snout-beetle of any kind.

If you had sent along the "nest" out of which you took the wingless moth, I could have told you with tolerable certainty to what species the moth belonged. At present I cannot; for there are several species of these wingless gentry that are hard to distinguish. It certainly cannot be the female of *Hibernia tiliaria*, as you conjecture, for that species transforms underground, like the Canker-worm moth, and makes no "nest" or cocoon on the infested tree. The specimen sent cannot be distinguished from the wingless female of the Canker-worm moth; but neither does that species make any "nest" on the tree. Perhaps a Canker-worm moth had accidentally crawled into a "nest" made by some other insect.

Dr. Houghton, Penn.—All the specimens of Bark-lice that you sent belong to the Native American species (*Coccus Harrisii*). I have searched carefully every twig that you have sent, and cannot find a single individual on them belonging to the Imported Species (*Aspidiotus conchiformis*). Consequently, although, as you say, you have 20,000 trees afflicted in this manner, you ought not to be greatly alarmed. I never knew a tree killed by this Native Bark-louse, while in this single State there have been millions of trees killed by the Exotic Bark-louse. Even if you do nothing at all towards counterworking this pest, I am persuaded that in process of time it will be more or less completely subdued by the Lady-birds and other insects that make war on it. Repeatedly in the woods I have seen clumps of crab-trees infested as badly as your trees seem to be; and two or three years afterwards not a scale could be found on them. Our Rock Island nurseryman, Mr. Kinney, has also had this species on a few of his apple-trees for seven or eight years, and he does not think that they have done him any very material injury, although he left them entirely to their own devices. Not that I would recommend you to follow neighbor Kinney's example; neither would I recommend you to fold your arms and do nothing, if some Irishman were coming at you with his shillelagh. Still, it is some comfort to know that, even if the worst comes to the worst, life is not endangered; and that the enemy is armed, not with bowie-knife and revolver, but only with a club.

The eggs were quite plump and healthy under the scales in all the specimens sent, except in No. 4, ("Bark-louse on dead bark,") where of a dozen scales examined, only three contained plump, healthy eggs, the remaining nine, which were probably old scales of A. D. 1865, containing nothing but the shrivelled remains of eggs. As the lot No. 2 ("Specimens taken from the body of a tree that was thoroughly painted last summer with a wash made by dissolving 1 lb. of concentrated lye in 1 gallon of water") contained perfectly healthy eggs, one of two things must necessarily follow; either 1st, that you did not have every single limb and twig of this tree painted with the lye, and thus that numerous bark-lice escaped death, and afterwards crawled on to the parts which had been painted, and then made last autumn the scales which you now send; or 2nd that, if you had the entire tree painted, twigs and all, even lye as unusually strong as that which you used, will not kill bark-lice when applied in the summer. I rather incline to the former supposition, though I know nothing personally of the effects of lye upon bark-lice. All accounts, however, seem to agree, that lye, when applied in summer, checks up the bark-louse.

In applying kerosene to destroy any kind of bark-lice, my plan has always been first to prune very heavily all the limbs to which I am about to apply it, so as to leave nothing but wood of say ¾ inch in diameter. I do this partly for convenience' sake, and partly because a limb badly infested by bark-lice needs pruning as much as a transplanted tree does, because it is similarly weakened and impoverished by the loss of the proper supplies of sap. Although limbs thus pruned put forth new sprouts during the summer, yet it is always easy to distinguish them from unpruned limbs, and thus to follow out the results of your operations, without any danger of mistakes.

As to specimen No. 3, ("Bark thought to be injured by the lye applied to it,") in any case you would be a far better judge of this matter than I am; and having nothing but a partially dried specimen to form an opinion upon, I am doubly bound to hold my tongue.

I can add nothing of any value to what I have already said on this subject, further than to caution those who may be experimenting on the best and most successful mode of destroying bark-lice, not to be deceived by a very puzzling phenomenon: Both with our Native species and with the Imported species, old dead and dry scales, which were formed 1½ or 2½ years ago, and which had the eggs underneath them completely killed by kerosene or other such preparation 1 or 2 years ago, still adhere to the bark after the lapse of 1 or 2 years, and are externally undistinguishable from scales formed last autumn and containing healthy and plump eggs. They do not, however, adhere so tightly to the bark as do the recent scales, and when they are raised with the point of a knife, a lens of very moderate power shows at once that they contain no plump, fresh eggs, but only a shrivelled mass of old dead and dry eggs.

Edward Orton, Ohio.—The Plant-louse that infested the White Pine in your yard last summer was most probably the *Lachnus strobi* of Fitch, which, as that writer tells us, gives the bark of the infested trees "a peculiar black appearance," and is largely attended by ants. Their elongate-oval, shining black eggs, about 0.40 inch long, attached in regular rows of from 5 to 20, but usually, as you observe, in rows of 8, to the thread-like leaves of the pine, have, I believe, hitherto escaped observation. The specimens sent are precious, because, as I have already remarked in my Paper on the Plant-lice, there are certain species of Plant-lice which appear never to lay any eggs at all. I have myself described the eggs of a giant species of *Lachnus*, *L. caryæ*, Harris, which occurs not only on the Hickory, but on the Oak and Basswood. (*Proceedings, &c.*, I. p. 303.) If you wish to rid your tree of these lice, I should recommend you to catch a dozen or two Lady-birds and place them gently on the infested twigs about the time that the eggs of the Plant-lice are hatching out.

John Murphy, Georgia.—The cocoons full of eggs which you send are those of the female of the common Bag-worm, Basket-worm, or Drop-worm, (*Thyridopteryx ephemeræformis,*) respecting which see Mr. Rathvon's article in the PRACTICAL ENTOMOLOGIST, II. pp. 53—4. The cocoon without any eggs in it is that of a male of the same species. In this species, as in our Northern Vaporer Moth, (*Orgyia leucostigma,*) the female is wingless and never leaves her cocoon, the male, which has full-sized wings and can fly well, searching her out, and consummating the marriage rites at her own house. The only difference in the economy of these two insects is, that the female Bag-worm lays her eggs *inside* her cocoon, and the female Vaporer Moth plasters them to the *outside* of her cocoon with a kind of varnish. Hence, as you will at once perceive, this species of insect cannot spread as rapidly through an orchard as those which have winged females, capable of flying to the other end of the county to search out a suitable tree on which to lay their eggs. For here it is only the larva of the female that is locomotive, and she, of course, has nothing but her legs to trust to, or perhaps an occasional squall of wind, for gaining another tree. The fact of your early apple-trees not being attacked, is probably due to their being located in a different part of your orchard. Possibly, however—for insects are very capricious—the Bag-worms may prefer late Apple-trees for some unexplained reason. In the same manner certain varieties of Plum are peculiarly subject to the attacks of the Curculio, and the Peach-blow variety of Potato is avoided, when possible, by the Colorado Potato-bug.

To restore your late Apple-trees to a healthy bearing state, all you have to do is to pluck off and destroy, carefully and effectually, for one single winter, all these egg-bearing cocoons that you can find on them. You will then put a permanent check to the future propagation of the insect; for the females have no power to fly in upon your trees from other quarters, and the chances are greatly against one of the larvæ reaching them for many a long year to come. Mr. Glover as well as yourself—as you will see from the passage which I have quoted from him—has noticed these Bag-worms to occasionally infest the Cotton-plant.

F. T. Pember, N. Y.—The centipede which you now send (No. 1) belongs to an entirely different group from *Polydesmus* and *Iulus*, having only a single pair of legs to each joint of its body instead of two pairs. This group is supposed by Dr. Wood to be carnivorous. No. 2 is the larva of some small beetle, somewhere in the neighborhood of the *Nitidula* family. Nos. 3, 4 and 5 are young individuals of the Pretty Porcellio (*P. limatus*) of Fitch, one of several species described by that author, and commonly known as "Sow-bugs." They are not insects, but Crustaceans. There is probably some mistake about the *Oniscus asellus* of De Kay's *Nat. History of New York.* Dr. Fitch says that the genus *Oniscus* does not occur in New York, and *asellus* is a European species. The "cocoons" found among the turnip roots are the coarctate pupæ (puparia) of some species belonging to the great *Musca* family, which is now subdivided into many distinct families. They resemble one another too closely to refer them to any particular genus or species. I will give the information you desire about entomological apparatus in a future article.

Storrs, Harrison & Co., Ohio.—The eggs sent are those of a Catydid, and the same as those referred to in the answers to C. M. B., of N. J., and Geo. Haines, of N. J., in P. E. II. pp. 57 and 73.

Jos. Wood, Ohio.—When I said that "if any insect punctured grapes as the common Curculio punctures Plums, it was an entirely new fact," I meant that no such fact was on record. You think that you have observed such a fact, and say that you have "every year hundreds of thousands of grapes punctured by some insect, and afterwards find the larva eating the grape. The grape does not rot, but after a while drops from the stem before it becomes ripe enough to cut, sometimes showing a premature reddening. Mr. Moran's grapes, no doubt, had the black rot and nothing else." (See P. E. II. p. 56.) I shall be glad to receive the promised specimens next summer. The facts you mention certainly seem to show that you are right; but I can tell better what to think when I see what kind of larvæ are in the diseased grapes. Several larvæ producing two-winged flies are already known to breed in decayed grapes, just as they breed also in other kinds of decaying vegetable matter.

H. C. Munger, Virginia.—Your suggestions shall be attended to at as early a date as possible; but we are often cramped for room in our little Journal.

J. N. McLeod, Wisc.—Most of the cheap microscopes are good for nothing. As to the one advertised in the P. E., I am not acquainted with it. A really good microscope of very high magnifying powers costs a large sum of money; and for all ordinary purposes you will find simple lenses, either Stanhope or Coddington, such as you can procure of Jas. W. Queen & Co., of Philadelphia, amply sufficient and much more convenient.

John B. Lyon, Ohio.—The cocoon sent was manifestly the work of some large Moth, perhaps of *Attacus Prometheus.* Inside it I counted no less than 19 smaller cocoons, closely agglutinated together in an oval mass, and each containing a larva. These larvæ had lived inside the body of the larva of the moth, devouring its vitals till they finally destroyed it after it had spun its cocoon, but before it had passed into the pupal state; for there was no pupal shell in the large enveloping cocoon. The 19 larvæ, if undisturbed, would have developed this coming summer into some kind of *Ichneumon*-fly, but what particular species I cannot say. I should have liked to breed the *Ichneumon*-fly from them, as they were entirely new to me, but, owing to not having been enclosed in a little pasteboard box, they reached me pressed as flat as a pancake, and ruined except as specimens for examination. Larvæ require as delicate handling as young babies; and I presume that in Ohio, when you want to send a baby any distance, you do not usually enclose it in a simple post-office envelop, and entrust it to the tender mercies of Uncle Sam's mail-bags.

Dr. Benj. Norris, Illinois.—The larvæ split out of Hickory wood are not Buprestidous but Cerambycidous, and no doubt belong to the pupæ which you send with them, and which were found in the same stick. If these last, as you suppose, belong to *Clytus pictus*, then the mature larvæ of that insect has got legs, and Dr. Horn must have been mistaken in supposing it to be legless. (See *Proc. &c.* V. pp. 204—5.) I suspect that the larvæ of both *pictus* and *robiniæ* are legless when immature, and afterwards acquire short legs. At all events, young larvæ sent me from Kansas as those of the Locust-borer, were legless. The larvæ enclosed in cocoons are those of some Fossorial Wasp, many of which make their nests in the old deserted holes of Borers.

W. W. Linn, Illinois.—The eggs on your apple-tree twigs are those of the common Plant-louse of the Apple-tree, respecting which see my Article on Plant-lice in the P. E. II. p. 39. They may be found at this time of the year on almost all apple-trees in larger or smaller numbers. You need not alarm yourself about them, as these Plant-lice, almost as soon as they hatch out, will be attacked by myriads of Insect Foes, as I have explained in the Article already referred to.

Isaac Hicks, N. Y.—The Bark-louse of the Tulip-tree which you send is the most gigantic species I have seen in this country, and is hitherto undescribed. The specimen had been bored above by some parasitic insect, and from some of the others there jolted out on the road the pupa-cases of a parasitic two-winged fly belonging apparently to the genus *Leucopis*, which is known to infest bark-lice. I shall be glad of full-grown living specimens. What you take for "suspicious looking eggs" on the bark are the young bark-lice already hatched out.

The cocoon of the "Basket-worm" is exactly like one which I have just received from Georgia. This insect, as is perpetually happening, has been differently named by different authors, each ignorant that the preceding author or authors had already named it. In such cases the scientific etiquette is, that the first name which is accompanied by a good and sufficient description, takes precedence of all the others. Consequently, as has been shown by Dr. Clemens, *Thyridopteryx ephemeræformis* is the correct name of this insect. Your remark that "in one locality on Long Island, N. Y., they were very plenty and destructive to the evergreen only," is interesting, as it confirms the fact that they prefer evergreens to deciduous trees. I cannot identify the "vine-hopper" without specimens.

R. B. Palmer, Mo., per Edt. *Rural World.*—The apple-twig sent is infested with the terrible imported Bank-louse, not the native species which is comparatively harmless. See on this subject, PRACTICAL ENTOMOLOGIST II. pp. 31—2, where figures of both are given, so that he that runs may tell the difference between them; and see also the answer to Dr. Houghton in this number.

☞Answer to C. F. A., N. J., will be given in the next number.

NOTICE.

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The Moss-Animals, or Fresh Water Polyzoa, (*with a plate.*) By Alpheus Hyatt.

The Fertilization of Flowering Plants. By J. T. Rothrock.

Insects and their Allies, (*with illustrations.*) By A. S. Packard, M. D.

The American Silk Worm, (*with illustrations.*) By L. Trouvelot. Continued.

The Land Snails of New England, (*with illustrations.*) By E. S. Morse. Continued.

Reviews.—Preliminary Report of the Geological Survey of Kansas, by G. C. Swallow. Annual Report of the Smithsonian Institution for 1865; The American Journal of Conchology.

Natural History Miscellany. Botany.—The Tertiary Flora of Brognon, France; Drying Plants by Heat—two methods. *Zoölogy.*—Flights of Butterflies. *Geology.*—The First appearance of man on our Planet; The Eozoon in Austria.

Correspondence.—Wasps as "Marriage Priests" to Plants. *Illustrated.*

Natural History Calendar.—New England Reptiles in April; Ornithological Calender for April; The Insects of Early Spring.

Proceedings of Scientific Societies.

Glossary for the Number.

Contents of Vol I, No. 3, May, 1867.

Some Errors regarding the Habits of our Birds. By Dr. T. M. Brewer.

The Food of the Sea Urchin. By J. W. Dawson, LL. D. *Illustrated.*

The Moss Animals, or Fresh-Water Polyzoa. By Alpheus Hyatt. Continued. *With a plate.*

The Land Snails of New England. By E. S. Morse. Continued. *Illustrated.*

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The Birds of Spring. By J. A. Allen.

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As letters still pour in from parties desiring to obtain the Works advertised for sale by me, in the October (1866) number of the *Practical Entomologist,* I hereby give notice that *all* of the Books I advertised, were disposed of soon after the issue of the number containing the advertisement. GEORGE HILL.

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THE

Practical Entomologist.

A MONTHLY BULLETIN,

Published by the American Entomological Society. for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

Vol. II, No. 8. MAY, 1867. Whole No. 20.

The Practical Entomologist.

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☞Edited by Benj. D. Walsh, Rock Island, Illinois.

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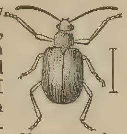
PHILADELPHIA, MAY, 1867.

THE GRAPE-VINE FIDIA.

(*Fidia viticida*, new species.)

The annexed figure represents a leaf-eating Beetle, hitherto unnoticed by other writers as a noxious insect, which preys extensively upon the grape-vine in Kentucky, and probably in other Southern States. It exists also on the wild grape-vine in small numbers, as I have myself observed, both in North and South Illinois; and I once noticed a single specimen on a Catawba vine in my own garden. Hence it is not improbable, that in some future year it may swarm in Illinois, as abundantly as in 1866 it did in Kentucky. The following account of its operations in the latter State in 1866 is reproduced from the Practical Entomologist, Vol. I, p. 99.



Chestnut-red, hoary with whitish hairs.

According to Mr. C. S. Jackson, of Kentucky, this beetle is making great destruction in his vineyards. "It commences," as he tells us, "about the middle of June, first attacking the upper surface of the leaves by eating holes into it, and if not checked, increases with the heat of the season, until whole acres of leaves are changed into worthless shreds, or become as full of holes as a sieve." Most probably, as with the Flea-beetle of the Grape-vine, it is in the larva state that it does the principal part of the damage; and as the larvæ of all beetles are altogether unlike the perfect insect, its identity with the perfect insect will often not be recognized. The larva of this species, as we may infer from analogy, will be a six-legged grub, probably of some obscure shade of pale drab or brown, and resembling in form that of the Colorado Potato Bug, (figured Practical Entomologist, II, p. 13,) but of course proportionally smaller. It will be found sluggishly feeding on the surface of the leaves, along with the perfect insect, and as soon as ever they first appear in the spring, every exertion should be used to destroy them, in regions where they have been known to swarm. A single female larva destroyed at that time, may prevent the generation of a hundred thousand in the course of the summer; for I have little doubt that this species is many-brooded, i. e., that there are several generations of them in one year.

It will be observed that there is considerable resemblance in the general shape and make of the Grape-vine Fidia and of the Grape-vine Flea-beetle, (*Haltica chalybea*, figured Practical Entomologist II, p. 50.) The latter insect, however, is dark blue instead of chestnut-red, and smooth and polished instead of hairy and opaque; and it differs also in having the hind thighs much thickened, so as to enable it to jump like a Flea, whereas the Fidia has the hind thighs no stouter than the other four thighs and has no power to jump. Both insects, as well as the Striped Cucumber Bug, (*Diabrotica vittata*,) the 12-spotted Flower-beetle, (*Diabrotica 12-punctata*, figured Practical Entomologist, I, p. 110, fig. 1,) the Colorado Potato Bug, (*Doryphora 10-lineata*,) the Gold Bug, (*Cassida pallida*,) which infests the Morning Glory and the Sweet Potato, the Striped Tortoise-beetle (*Cassida bivittata*,) which infests the Sweet Potato in Southern regions, and the Grape-vine Colaspis (*Colaspis flavida*, figured Practical Entomologist, II, p. 68,) which in 1866 attacked the Grape-vine very generally throughout the Northern States, belong to a large group of Beetles, (the great *Chrysomela* family,) distinguished by having only four joints to all their feet, (tarsi,) and by their larvæ almost universally feeding upon the leaves of various plants. Hence they are many of them very obnoxious to the Agriculturist. In common with another large group of Beetles—the great Curculio family, known in English as the Snout-beetles—almost all these beetles have the habit of doubling up their legs, when they fancy that they are about to be attacked, and dropping suddenly to the ground, where they lie still for a short time and pretend to be dead. Among vertebrate animals we find the same remarkable habit of shamming death in the common opossum.

As it appears that this Grape-vine Fidia, though long well known to myself and other Entomologists, is a new and undescribed species, I annex a full description, for the benefit of those who are curious in such matters. Farmers generally are apt to think the details of differences, between different species of insects, a matter of no practical importance; but they should recollect, that without recognizing the minute distinctions between the Colorado Potato Bug and another allied species with which Dr. Fitch and had confounded it, (see PRACTICAL ENTOMOLOGIST, I, pp. 2—3,) it would have been impossible to arrive at any correct conclusions about the habits and future progress of the former. Just so with the Hateful Grasshopper of Colorado. (PRACTICAL ENTOMOLOGIST, II, pp. 1—5.) Without carefully distinguishing between this insect and the Red-legged Grasshopper, so common in the Valley of the Mississippi and on the Atlantic seabord, our Illinois farmers might suppose that they were liable any year to inflictions, such as overtook Kansas and Nebraska last autumn, together with the far more terrible consequences which will not improbably follow, in this coming season of 1867.

Fidia viticida, new species. Chestnut rufous, punctured and densely covered with short grayish-white prostrate hairs, so as to appear hoary. *Head* rather closely punctured, with a very fine longitudinal stria on the vertex. Clypeus and mandibles glabrous and black, the clypeus with a subterminal transverse row of punctures, armed with long golden hairs, the mandibles minutely punctured on their basal half. Palpi and antennæ honey-yellow verging on rufous, the antennæ ¾ as long as the body, with joint 4 fully ½ longer than joint 3. *Thorax* finely and confluently punctured, about as long as wide, rather wider behind than before, the sides in a convex circular arc of not quite 60°, the males with the thorax rather longer and laterally less strongly curved than the females. Elytra punctato-striate, the striæ subobsolete, the punctures approximate, and rather large but not deep, the interstices flat and with close-set fine shallow punctures. *Legs* with the anterior tibiæ of the male suddenly crooked ¾ of the way to their tip; anterior tibiæ of the female as straight as the others. Length ♂ .24—.27 inch; ♀ .24—.28 inch.

Described from 5 ♂, 5 ♀. Very near *Pachnephorus* (*Fidia*) *viticolus* [*-ola*] Uhler, which is said to be .21 inch long; but Dr. LeConte, who has typical specimens, tells me that that species differs, not only in being smaller, but in the thorax being more strongly punctured; and that common as is *viticida* it is as yet undescribed. A species of *Fidia* of which I have 2 ♂ 3 ♀, is identified by Dr. LeConte from typical specimens as *Pachnephorus* (*Fidia*) *longipes* Melsh.; and differs from *viticida* only in being smaller, (.19—.21 inch,) and in the ground-color being black instead of chestnut rufous. The males have the anterior tibiæ crooked in the same remarkable manner as in *viticida*. The genus *Fidia*, on careful examination, appears to differ from the genus *Pachnephorus* only in the body and legs being much longer, in the thighs not being clavate, and in the above-mentioned singular sexual destinction in the anterior shanks (tibiæ.) The reason of this last character is obvious. *Fidia* having very long legs, the male is enabled, during copulation, to entirely embrace the body of the female with his front legs; consequently it is an advantage to him to have the tip of the front tibiæ suddenly crooked inwards. *Pachnephorus* having comparatively short legs, the male cannot thus clasp the body of his female, and therefore it would be no advantage to him to have the tips of his front tibiæ crooked inwards.

It is astonishing how many different organs are worked in by nature, for this seemingly insignificant object of enabling the male insect to grasp the female firmly. For example, among the Ground-beetles (*Carabus* family,) almost all the males have either their two front feet or their four front feet (tarsi,) furnished with broad hairy cushions for this purpose. Among the water-beetles (*Dytiscus* family,) many genera have, in addition, the front feet of the male armed with a round flat sucker-like enlargement of one of its joints, to enable him to adhere to the slippery body of the female. In the male Dragon-flies (*Libellula* and *Agrion* families,) the appendages at the tip of the tail are modified in an almost infinite variety of curious patterns, to enable them to embrace the neck of the female. The male Horn-bugs (*Lucanus* family,) have their aws enormously enlarged, lengthened and armed. with teeth, for a similar purpose. And in a genus of the Darkling-beetles (*Tenebrio* family,) known as *Penthe*, a few of the middle joints of the antennæ of the male—3 joints in one species, four in the other—are dilated and furnished below with a cushion of hairs, precisely as in the front tarsus of a male Ground-beetle, and obviously for the same end. Finally in a large and common Ground-beetle (*Calosoma scrutator*,) as has been observed by LeConte, and in a small and rare beetle, (*Xylophilus basalis* LeConte,) as was first noticed by myself, the middle tibiæ (or shanks) of the male are curiously bowed inwards for the same almost universal purpose. Thus we find that five distinct organs of the body—the tarsus or foot, the tibia or shank, the appendages at the tail, the jaws and even the antennæ—are variously modified in various species, and perverted, so to speak, from their normal functions, in order to facilitate the reproduction of the species.

Whether, with the old school of philosophers, we believe that each species of insect was originally created by the great Author of Nature, with all its present organs precisely as they now exist—or whether we believe, with a more modern school, that in pursuance of certain laws of variation and inheritance, originally established by the same great Author of Nature, the insects found in one geologic epoch have been very slowly and gradually modified and developed into those which occur in succeeding geologic epochs—the mind is lost in admiration at the beautiful and harmonious co-adaptations which we continually meet with, as page after page we turn over the Great Book of Nature.

B. D. W.

☞ We want 5000 more subscribers to the *Practical Entomologist*. Will not each present subscriber try to send us another?

ENEMIES OF THE RICE CROP.

Rice, as is well known to southern planters, is grown in plots of marshy land below the high-water mark of the adjoining rivers, but enclosed by embankments in such a manner, that they can be flooded or laid dry at the discretion of the rice-grower. By this alternation of wet and dry, not only are aquatic weeds scorched out and upland weeds drowned out, but noxious insects are effectually subdued upon precisely the same principle. As may be learnt from some very valuable articles on the cultivation of rice in the *Southern Cultivator* of Feb. 1867, "the rice in light lands is often attacked by grubs, which feed upon the roots; but a flow of 12 hours effectually destroys them." But, like St. Paul, the rice-crop is not only "in perils by land," but it is also in "perils by water." After the rice-fields have been flooded some time and the water becomes foul, it appears that the crop is injured by certain maggots, otherwise known as "water-weevils," which "make their appearance about the roots of the plant and destroy them," and also "destroy the germ of the rice in fields which have been thrown out for some time, or in which the stubble has been turned in, rendering it necessary to replant." But there is a remedy for everything but death. Having fought the upland grubs with water, the planter now subdues the water-weevils with drought, laying his rice-fields dry, for this express object, for three or four days at a time, so often as may be necessary.

Northern farmers are too apt to look down upon the whole system of Agriculture in the South as unscientific and barbarous; but they might often learn a useful lesson from such simple, but effective processes, as have been detailed above. Instead of racking their inventions to devise new washes for subduing all manner of noxious insects, composed of a hundred different ingredients, five score of which are perfectly useless, if they would only, as the Rice-planter has done, study the peculiar habits of each of their insect foes, and attack each of them by some simple weapon aimed at his one vulnerable part, they might very soon effect something considerable. As it is, it is every day becoming more notorious, that instead of the Agriculturists gaining upon the Insects in the North, it is the Insects that are gaining upon the Agriculturists.

The "water-weevils" and the "grubs," spoken of in the above extracts as injurious to the Rice-crop, are, I believe, wholly unknown to the Entomologist; and it would be an interesting task to trace them through their transformations, and ascertain into what perfect insect they change. This could probably only be done in the South, because in the North we have no rice-plants to feed them on. But from the simple inspection of specimens of these larvæ preserved in alcohol, it can be at once determined to what great group of insects each belongs; and even this would be something gained towards the increase of our stock of useful knowledge. Who will mail us such specimens, duly labelled, from the great rice-growing regions of the South? B. D. W.

THE CANKERWORM ONCE MORE.

There is an excellent article on the best mode of fighting this pernicious insect, in the columns of the *Iowa Homestead*, of March 13, 1867, from the pen of W. G. C., of Monroe county, Iowa. The author's experience establishes the fact—which has been independently arrived at in several other parts of Iowa—that Sorghum is preferable to tar for preventing the wingless female moth from mounting the trunks of the doomed apple-trees, to lay her eggs thereon. His reasons in favor of Sorghum are, 1st, that it is cheaper and more readily procurable in the West than tar, the refuse skimmings, which would otherwise be fed out to hogs, being available for this purpose; 2d, that it does not dry up quite so fast as tar; 3d, that it can be applied directly to the bark of the infested tree without fear of injuring its health; while tar must be daubed on to a bandage, or if applied to the naked bark injures the tree more or less.

The facts ascertained by this writer, respecting the habits of the Cankerworm moth, tally exactly with those recently given in the PRACTICAL ENTOMOLOGIST. But I cannot resist the temptation of quoting his very graphic account of the mode in which he carried on the war against this pest of the fruit-grower:

> In 1866, very early, (I cannot recollect precisely the time, but it appears to me that it was as early as the last days of February), there were two or three summer-like days, but yet I had no idea that any insect could possibly be abroad; but curiosity led me to take a lantern in hand and go out into the orchard. I climbed up into the trees, (it was so cold that an overcoat was needed to keep comfortable), and there I found the varmints having a perfect fandango all through the trees—up and down the limbs, two and two, and *only one pair of wings between them.* I found they had stolen a march on me. Next morning, however, I prepared a bucket of molasses and an old broom, and gave the trunks of my trees a good coating, and when the dusk of evening appeared, I examined the worst infested trees. I discovered large numbers wallowing in the syrup, and from ten to twelve feet from the trees, could see others coming from every direction, on a bee line for the trunks of the trees. No navigator could lay his course with more precision; but alas, when they arrived at the molasses, they were invariably swamped.
>
> I employed two small boys every afternoon to go over my trees, (those infested), each with his bucket of molasses and old broom—giving the trunks a coating of eighteen inches or more, up and down the surface of each tree, and every morning we found ourselves well paid for the labor. I followed up this practice with my two little boys for over two months, and as long as I thought it paid.
>
> I have the pleasure to say that the Cankerworm did my orchard no damage in 1866, and that I have had a reasonable amount of fruit, of which, perhaps, I will inform you further some day. One thing I verily believe, and that is, the man that does not protect his trees from the ravages of the Cankerworm will lose them, for their end is not yet.

NONE SO BLIND AS THOSE WHO SHUT THEIR EYES.

It is singular what a propensity some men have to go through life with their eyes shut. Here is the Editor of an Iowa Agricultural Journal, who is living in a State that is literally swarming with the New or Colorado Potato Bug, (*Doryphora 10-lineata*), and yet has not found out that the little pest can fly!! He must have been present when thousands of them flew across his path—but he winked hard, and would not or could not see them. Or perhaps, because, when flying, the insect displays a beautiful pair of rose-colored wings, he fancied that it was a Bee or a Butterfly. The following Editorial remarks occur in the *Iowa Homestead* for April 3, 1867:

> If our Western Potato Bug, which so far as we can discover, is wingless, both male and female, can annually make sixty miles Eastward in its course, it is no wonder the Cankerworm should disseminate itself so rapidly.

Now the truth of the matter is, that the Cankerworm does not, as a general rule, disseminate itself rapidly. It may exist in one township for years, before a few larvæ are accidentally deposited on the garments of some person passing through an infested orchard, and thence carried to an adjoining locality to propagate the breed there. The reason is plain. The female moth of the Cankerworm is wingless. On the contrary, both the male and female beetles that are designated as the "Colorado Potato Bug," fly with the greatest ease on hot, sunshiny days, though certainly they are not quite as strong on the wing as a Honey-bee or a Dragon-fly. During the summer of 1866 I do not think that I ever took a walk, without seeing one or two of these insects on the wing, and often I saw them sitting on weeds or fences miles away from any potato patch. Hence their eastward progress is not dependent upon contingencies and uncertainties, as is the case with the progress of the Cankerworm from one place to another. And we may therefore predict, with tolerable certainty, (now that I have clearly shown why they did not sooner emigrate eastward from the Rocky Mountain region), that their eastward progress after the year 1866 will be about at the same rate as their eastward progress from 1859 to 1866—namely, about sixty miles a year, or at all events, somewhere in the neighborhood of those figures. B. D. W.

DO HOGS DESTROY GRUBS?

BY JOHN TOWNLEY, OF MARQUETTE COUNTY, WIS.

My observations lead me to conclude that the hog will root up the earth for at least three purposes. 1st, If in fatting he is confined in a pen, the floor of which is boarded, he will root up the ground for the sake of eating the earth itself, especially if not provided with charcoal. Other domestic animals will eat earth also; it would seem to be a sort of brute medicine. 2d, Hogs will root up the ground for the sake of feeding upon roots. This I have watched them do. They are, for instance, very fond of the Virginian Spider-wort, which was a common plant here when first this place was settled, and now grows in large quantities along side the fences of many fields, where hogs do not run; but one may wander a summer's day over unenclosed land where hogs and cattle roam at will, and yet be scarcely able to find a solitary plant. Other plants, which are still common in enclosed fields, have disappeared from the open woods in like manner. I do not believe that this is entirely the work of hogs; but I am persuaded that they alone would have eradicated some species. 3d, Hogs will root up the earth in search of grubs. I was first made aware of this fact by noticing, when passing along a road where the soil was light, that the stumps by the road side seemed as if some one had been digging the earth away from them, and had laid bare their roots so as to cut out the grubs. I found afterwards the same labor had been bestowed on some stumps in a lane between my cattle-yard and a pasture; this was the work of hogs. A large white grub does good service by feeding on oak stumps underground, eating away the roots in time, and thus making the stumps easy to pull up. Is this something different from the two white grubs mentioned in the April number, as one is said to feed exclusively upon the roots of living plants, the other on dung? [Yes, it is probably the larva of the large chestnut colored Beetle, called Horn-bug, (*Lucanus.*) B. D W.]

Again, in the summer of 1864, we had the so-called 17 years' locust. These were glorious days for the hogs. Early and late they were at work; never before had my wood-lot, in which they ran, such a rooting up as then. Indeed, they turned over so much ground that I took advantage of their labors by sowing tame grass seeds. At first the insects kept mostly in the woods, but when something was about to come of their amatory singing, they resorted to the orchard in great numbers; and not liking the deep incisions made in the branches of my trees by their formidable ovipositors, I went over my trees night and morning, the insects being then more easily caught than in the middle of the day, and with a table fork, I jerked or picked them off into a pail containing some hot water. [Why the table fork? Use your fingers. "Locusts" neither bite nor sting. B. D. W.] They were then poured into a swill-pail, some meal added, and the whole mixed up with boiling water, and afterwards fed to the hogs. Any one learned in hog language would have known by the amiable expression of their eyes, as they turned them up now and then, to grunt their thanks, that the locust-soup was exactly suited to their taste.

On the south slope of a ridge between my place and the Post-office, the locusts were very abundant; hazel-bushes grow here and there, scattered by the road side, and if you have ever seen hogs on a nutting excursion, you have a correct idea of the way I have seen them hunt round the bushes for the locusts.

Three or four years ago, when mowing timothy, we found a patch several yards square, which was brown, as if the grass had been attacked by some mildew or fungus, and so killed. A brief examination sufficed to clear up the mystery. The roots were cut off as effectually as if a knife had been run underneath the sod, and the fat grubs seen in the soil left little room for doubt that this mischief was their work. [No doubt these were the common White Grub, the larva of *Lachnosterna quercina.* B. D. W.] As soon as the hay was hauled off I turned my hogs into this field. They soon found the spot where the grubs were, and worked it over most effectually. Now if they wanted earth to eat, surely they could have got what earth they required anywhere else, and with much less labor. If they were in quest of roots, they were sadly deficient in hog-wisdom to throw over ground in which the roots were already destroyed; but if they were hunting after grubs, then were they true to their hereditary instincts, and gave proof of their sagacity by hunting in the very spot where grubs were most abundant.

Hogs, I believe, are the cheapest and most efficient means most farmers can employ to destroy these grubs. Hogs are always on hand; but few farmers are provided with such a heavy roller or clod-crasher as alone would be effective, though to be sure it may be weighted.

If I may venture on a word of advice to my brother farmers in this matter, I would say, if you have a timothy meadow infested with the white grub, take a pailful of shelled corn, and when your hogs are somewhat hungry, entice them to the spot where the grubs are at work. Scatter the corn over the ground; as soon as the hogs have eaten all they can see, their snouts will of course be at work hunting for stray kernels; the loose sod will give way under their pressure, and the grubs be found; after that, I apprehend there will be no need to fence the hogs in, as recommended by Dr. Fitch. When they are through with their work, run the harrow over the ground, gather up the dry sods into a heap, and smother-burn them, so as to reduce the vegetable matter they contain to charcoal, not to ashes. When cool, spread the charred stuff over the ground, and re-sow at once, if it is desired to keep the field longer in grass. I presume I need scarcely add further, if the primitive, long-nosed prairie-rooters are better suited to this work than the improved moderns—and judging from my own experience, I have no doubt they are—by no means gives up your short-snouted, chubby, quick-feeding Suffolks and their crosses, on that account; but if needs be, get rather a thorough-bred alligator, and keep him expressly for grub-hunting purposes.

SELF-TAUGHT ENTOMOLOGISTS.

I do not know how it is, but I am perpetually meeting with Farmers and Mechanics, who know a great deal more about the Natural History of Insects than I do myself. It is true, they have never spent much time in observing the habits of Insects, and still less in studying the minute, though perfectly constant characters, which often separate one species from another. Neither have they read anything on the subject, except what they pick up from an occasional article about insects in the Agricultural Press, with the sad percentage of blunders and misstatements usually met with in the entomological lucubrations, which appear in many Periodicals of that class. Still they are excellent entomologists—in their own conceit; and without taking the trouble to read what some pains-taking and well-informed author has published about some particular insect, they never hesitate to jump into the scientific arena, armed at all points in the complete panoply of impenetrable ignorance, and throw down the gage of battle before that author's bewildered eyes. Why should they not? Mowing and cradling and ploughing all have to be taught; but knowledge of the habits and classification of insects comes by nature!

I thought that, having myself spent ten years in collecting insects in various parts of Illinois, and being acquainted with collectors in all parts of the Union, and having probed to the bottom several cases, where it was confidently asserted that the Colorado Potato Bug (*Doryphora 10-lineata*) had been captured in Illinois previous to 1864, and found those cases to be all of them without exception nothing but mistakes, I ought to know something about the geographical distribution of this insect, in my own State at all events. No such thing. A gentleman from Illinois rushes into print in the columns of the *Rural American* of March 15, 1867, and asserts that I am utterly mistaken in saying, that the Colorado Potato Bug had never been taken in Illinois previous to 1864. Why? Because he himself took a specimen on a rose-bush "in Naples, a village on the left bank of the Illinois River, in the spring of 1863, and placed it in his cabinet." But how does he know that it is the genuine Colorado Potato Bug? Shades of Linnæus and Latreille! He knows it, because he has seen in the *Rural American* "a faithful picture" of the insect in question, (which by the way was copied without acknowledgment from the PRACTICAL ENTOMOLOGIST,) and because his specimen is exactly like the picture!! Moreover he has forwarded the specimen to the *Rural American*, and the Editor confirms his statement as to its being "just like the cut in the *Rural* of Feb. 1st, representing one of these bugs." Therefore it is the genuine Colorado Potato Bug. Therefore I am mistaken. Which was the the thing to be proved.

When lawyers assent to the truth of the facts asserted by the opposite party, but deny the conclusions deduced from those facts, they put in what is termed a "demurrer." So now do I "demur" to the plea of the gentleman from Illinois. I fully allow that his bug, captured in 1863, is exactly like the wood-cut of the Colorado Potato Bug which appeared originally in this Journal, and was so faithfully reproduced, line for line and shade for shade, (always without acknowledgement), in the *Rural* of Feb. 1st, 1867. I allow further that both these wood-cuts are as correct representations of the genuine Colorado Potato Bug, as can well be executed in that style of art, without magnifying the insect very greatly. Still I deny the conclusion to which the Illinois gentleman so confidently jumps, namely, that his Bug must be a genuine Colorado Potato Bug.

If this self-taught Entomologist from Illinois, instead of leaning upon a broken reed and trusting for Entomological facts to the Agricultural Press, had had the good sense to take in the PRACTICAL

ENTOMOLOGIST from its commencement, he would have found in the very first number of that Journal an article written by myself, in which it is conclusively shown that there are two perfectly distinct species of *Doryphora—juncta* and 10-*lineata*—which are yet so remarkably alike in their markings and coloring, that they were confounded together by so excellent an entomologist as Dr. Fitch; although, by the way, seven years before that author wrote, some of the principal distinctions between the two, had been clearly pointed out by Rogers. Moreover, he would have perceived very clearly that the characters, that distinguish these two species, are not such as can be given in an uncolored wood-cut of the size of nature; and that consequently the very same wood-cut will represent one species just as well as the other. He would also have found there the proof, that 10-*lineata* infests the potato and *juncta* never does; and that *juncta* had been captured for time immemorial in Illinois, but 10-*lineata* not, so far as could be ascertained, till 1864. Lastly, he would have seen a Synopsis of the principal points of difference between the two insects, so that he could have established the fact at once, that his specimen was a true *juncta*, and "not by a jugful" a genuine Colorado Potato Bug.

This is not the first, nor the second, nor the third, nor the fourth time, that I have known it to be roundly asserted, and sometimes by entomologists who thought themselves "some pumpkins," that they had years and years ago taken the true genuine Colorado Potato Bug in Illinois. In every such case it turned out, on subsequent investigation, that they had mistaken *juncta* for 10-*lineata*. I conclude, therefore, that the correspondent of the *Rural American* has fallen into the same error; more especially as we can readily guage his entomological knowledge by his ludicrously absurd assumption, that an insect can be always identified with certainty from an uncolored and unmagnified wood-cut.

Let it be clearly understood here, that I blame no man, whether Editor or Correspondent, for not being a first-rate Entomologist. I know from my own personal experience, that it requires almost a whole lifetime to master the rudimentary principles of the science, and to acquire that practical knowledge of insect life which no mere book-knowledge can ever supply. We cannot all of us know everything; and even Editors, who are popularly considered to be, like the Pope of Rome, the very incarnation of infallibility, do actually sometimes, or at all events once or twice in a century, make some wee little blunder, in some department of knowledge with which they do not happen to be familiar. Even the admirable Crichton must have been very ignorant in Chemistry, Electricity and Geology; and Scott's Infantry Tactics would probably have puzzled to death either Julius Cæsar or Alexander the Great. Still it is provocative of sudden convulsions in the diaphragm, to see any man criticize what he has never read, and theorize in sciences of which he has not learnt the A, B, C. But blessed are the ignorant, for they know nothing and think that they know everything; and there are some minds that are so intellectually uncultivated and unclothed, that like Adam and Eve in the Garden of Eden, "they are naked, and know it not." B. D. W.

PEAR-TREE AND APPLE-TREE INSECTS.

The Pear and the Apple are, as is well known to Botanists, very closely allied. Reasoning *a priori*, therefore, we should naturally infer, that insects which feed upon a great variety of widely distinct plants, including the Apple, would also be found on the Pear. For example, the great *Cecropia* moth feeds upon apple, plum, cherry, currant, barberry, hazel and hickory leaves, and also, as I have just heard from Dr. F. W. Brewer, of Boston, very extensively upon pear-leaves.

But there are two well-known insects, which, although they are common on the apple and a variety of other trees, yet never, so far as I can find out, attack the Pear. The first of these two is the notorious Tent-caterpillar (*Clisiocampa americana*), which feeds freely on Apple, Plum, Cherry, Birch and Willow, and yet, according to Dr. Trimble, will starve on the Pear. (*Fruit Insects*, p. 104.) The second is the Striped Borer of the Apple, (*Saperda bivittata*,) which is death upon the Quince, a tree belonging to a distinct botanical genus from the Apple and Pear, and yet appears never to be found on the Pear, though it is so very common on the Apple.* At all events Mr. Coleman, of St. Louis, the editor of the *Rural World*, says that he "has been cultivating pears for a number of years, and has never been troubled with the borer;" and O. P. Moran, of Barnesville, Mo., states that he has "borers and caterpillars" on his apple-trees, but neither of them on his pear-trees, although of these last he has as many as fifty trees. (*Agr. Rep. Missouri*, 1865, append. pp. 134, 402.) In New Jersey, indeed, they found a very large borer troubling the buts of their pear-trees in 1866; but this insect, of which I received a specimen, does not even belong to the same family as the Striped Borer (*Cerambyx* family), but to the *Prionus* family, which is represented by larger and rarer beetles. What particular species this large pear-boring larva would have produced, I cannot say for certain, as the specimen after going underground unfortunately died. But I conjecture that it would have produced a large beetle, *Orthosoma cylindricum*, which may be found figured in Harris's *Injurious Insects*, (p. 96,)and which has been supposed, for very insufficient reasons, to feed upon pine. (See PRACTICAL ENTOMOLOGIST I, p. 90, and Fitch *N. Y. Rep.* II, § 239.)

From the above facts—if they be facts, as I believe them to be—we may draw two inferences, the one theoretical, the other practical. 1st. Not to be hasty in jumping to conclusions as to the food-plants of insects, from botanical analogies; and 2nd, that we need not soap the trunks of our Pear-trees in the spring to keep off the borer; nor go over their twigs in the winter in search of the egg-masses of the Tent Caterpillar Moth. B. D. W.

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* Harris says, that "the trees and shrubs principally attacked by this borer, are the apple-tree, the quince, the mountain-ash, hawthorn and other thorn-bushes, the June-berry or shad-bush, and other kinds of Amelanchier and Aronia." (*Inj. Ins.* p. 108.)

MORE UNIVERSAL REMEDIES.

The following appears in the *Monthly Report* of the Washington Bureau of Agriculture, February, 1867, p. 60. It was sent to us long ago, but we did not think it worth while to cumber our columns with such nonsense. Now, however, that it has made its way into print, we will furnish the bane and the antidote both together:

> #### DESTRUCTION OF INSECTS.
>
> A correspondent writing from New York communicates the following recipe for the eradication of insects, &c., with the assurance that where it is properly applied, these pests will, in a great measure, disappear from the orchards, graperies, &c. He wrote this direction for preparation and application:—"*Preparation.*—Saw a hogshead in two; put twenty or thirty pounds of sulphate of iron into one half, and fill up with chamber-lye; (water will answer, but urine is best). When the liquid becomes black it is fit for use." "*Application.*—The preparation must be applied to the trunks and branches of trees, and poured round the collars, which will keep off ALL WORMS infesting these parts, and add vitality to the trees. It is also claimed that trees, grain, vines, &c., on being steeped (the roots) with the liquid a few hours before planting, will escape all worms which infest the roots, trunks, and branches, and the growth will be much accelerated." The writer further states that "sulphate of iron placed in the crotches of the tree and branches is of great benefit, and when applied early to the branches, trunks, and roots of trees, will avert the falling off of the fruit."

Remarks by B. D. W.—1st. The insects that infest fruit-trees differ as much from one another in their structure and habits, as a monkey differs from a rabbit, or a bat from a field-mouse. Is it likely then, that the same chemical substance will be universally offensive to all of them? Perhaps the writer of the above found, or fancied that he found, his chamber-lye broth offensive to some particular insect. But does it therefore necessarily follow that it should be offensive to "all worms" infesting fruit-trees? Quinine cures the ague. Does it follow that it will cure the gout? Sulphur cures the itch. Does it follow that it will cure neuralgia?

2d. It is a distinguishing characteristic of a veritable quack, not to fix any limits to the dose which he recommends. "Being purely vegetable and consequently harmless, these pills may be taken in any desired quantities without any deleterious consequences whatever." Thus our Tree-quack orders half a hogshead of his medicated urine to be prepared, and for aught that he says to the contrary, the entire hell-broth may be poured round the roots of a single small tree with the most beneficial results. I have known a large apple-tree, that stood in a boys' play-ground, killed in no very long time by the continual application to its roots of the unsavory fluid, which forms one ingredient in the above panacea.

3d. A man who believes that steeping the roots of a tree, for a few hours before planting, in the above mixture will kill any borers that may already exist in its trunk, has more Faith than I have. "It is CLAIMED that, &c., &c." What we want is not *claiming* but *proving*.

4th. He that believes that sulphate of iron, placed in the crotch of a tree, in any quantity not sufficient to kill the tree itself, will prevent the fruit falling, if badly attacked by the Curculio or the Apple-moth, ought immediately to turn Mormon or Mahometan. To such a man's ravenous swallow, the simple truths of the Bible are not sufficiently strong food; he requires, in addition, the outrageous absurdities of the Koran and the Book of Mormon to satiate his appetite for believing.

HOP-GROWING IN THE WEST.

I recently cautioned Western Hop-growers, to be careful how they introduced the Plant-louse of the Hop into their Hop-yards from the Eastern States. (PRACTICAL ENTOMOLOGIST, II, p. 70). I have since learned from an experienced Hop-grower at Rock Island, that this little pest has already made its appearance in great numbers in two different Hop-yards in Michigan. With proper care, it may be prevented from extending farther West for many years. But the mischief is that Hop-growers fancy that they know more about insects, than men who make such matters the study of their lives. Incredible as it may seem to well-informed Entomologists, I find that they very generally believe, that the lice in their yards are not propagated from other lice, in the ordinary course of nature, but that they are specially created from time to time in each locality by the Great Author of Nature. Yet these same men would laugh me to scorn, if I were to assert that a calf or a pig, or a lamb had been "specially created" some fine morning on somebody's farm. Why? Because they understand perfectly well the generative economy of Cows and Hogs and Sheep, while they know nothing at all of the generative economy of Plant-lice. But to those who are familiar with the Natural History of Plant-lice, one thing seems just as incredible as the other; and I could just as readily believe that a Colt was created out of nothing in my stable, as that a Plant-louse was created out of nothing on my Hop-vine.

The following extract from a letter, recently received from a Hop-grower in Michigan, will give some idea of the mischief that is being worked out in that State by this little insignificant fly, the body of which is scarcely bigger than a mustard seed. Of course the idea that it is the same species of Plant-louse that infests the Hop, the Grape-vine and the Currant, is a mistake. Indeed, if this were really so, since the Currant Plant-louse has existed time immemorial in the United States, there could then be no possible reason why it should never have attacked the Hop till the year 1863, in this country. Whereas, if it is a distinct species, and has been recently imported from Europe, we see at once why this should be so.

> We have had rather a poor crop of hops last season. The Hop-fly has almost destroyed them in many yards—

> mine ran about 600 lbs. to the acre [an average crop is from 1200 to 1500 lbs]. I think the prospect is worse for next year, as this part of the country is swarming with them. They are on the grape-vines and currant-bushes, and everything which they can live upon.

When will the world understand, that a decent acquaintance with the rudiments of the Natural History of Insects is of real practical dollars-and-cents' importance to the nation? Here is a Noxious Insect insidiously spreading by slow degrees over the whole country; and its progress cannot be effectually arrested, because the popular mind believes in the exploded absurdities of our great-grandfathers! The Hop-louse has already damaged the Eastern States to the extent of millions of dollars annually; and it is to be suffered to run the same destructive course in the West, because "Bugs" are little vermin, that are unworthy the notice of rational men!

If the rudiments of Natural History were taught, as they ought to be, in our Public Schools, such lamentable errors as those alluded to above, would not be so common. As much as a hundred years ago, Linnæus laid it down as a universal law, that every living thing sprang from an egg or seed, or some kind of germ. (*Omne vivum ex ovo*). But many otherwise well-educated teachers, believe to this day, that frogs are engendered out of mud, and insects out of decaying vegetable matter.

B. D. W.

THE WHEAT MIDGE.—Jumping to a conclusion.

In the *Maryland Farmer and Mechanic* for Aug. 1865, I find the following assertion respecting the Wheat Midge, which insect, as it appears, is popularly called in Maryland "The Milk Weevil." In the West, farmers know it as "the Red Weevil."

> Usually there appears simultaneously with the weevil a parasite called the *Platygaster punctiger*, which is as destructive to the weevil as the weevil is to the wheat. Several years ago Dr. Asa Fitch, State Entomologist of New York, was of the opinion that this parasite had not yet reached this country; but the experience of this immediate section seems conclusive that it has. The weevil has appeared at least twice in Franklin county, but never prevailed three consecutive years.—In 1862 it entirely destroyed two patches of late wheat we had, and in 1863—4 it did not appear in any of our fields. The existence of the parasite is also proved by the Ohio Agricultural reports of 1860, in which it is shown that in forty counties the weevil increased for several years and then disappeared.

Granting that there really is some parasite that preys on the Wheat Midge, how does the above prove that that parasite is *Platygaster punctiger?* The assumption is quite gratuitous. *Platygaster punctiger* (properly *Pl. penetrans*[*]) is one of the three species mentioned by Dr. Fitch, as infesting the Wheat Midge *in Europe*;[†] and the chances are always about 20 to 1 against any European insect being found also in America.

But, in point of fact, it is proved as clearly as any negative assertion can be proved, that the Wheat Midge is *not* infested by any parasites in America. Dr. Fitch, who has paid particular attention to the Natural History of this insect, states as follows in the *Journal of the N. Y. State Agr. Soc.* for March 1862:—

> After the full investigation of the subject which I have now made, I can state this fact with confidence—*we have no parasites in this country that destroy the wheat midge.* The insect so common on wheat, and which resembles the European parasites of the midge so closely that, in the New York Natural History, it is described as being one of those species, and in the Ohio Agricultural Reports it is confidently set down as another of them, I find has nothing to do with the wheat midge, but is the parasite of an ash gray bug [*Nabis fera*—a cannibal species] which is common on grain and grass, laying its eggs in the eggs of this bug, and thus destroying them. [See also Fitch, *N. Y. Rep.* III, pp. 78 and 112, and P. E. II. p. 29.]

The argument based upon the fact, that the Wheat Midge disappears suddenly in certain years, is worth but little when we consider, that *Thrips* is a cannibal insect, as I have shown, and not, as had been previously imagined by all authors, a vegetable feeder; and that *Thrips* is known to occur in very large numbers on ears of wheat infested by the Wheat Midge.

B. D. W.

THE TREE-CRICKET AGAIN.

(*Œcanthus niveus*).

[From a letter from Edward Orton, of Yellow Springs, O.]

The Tree-cricket is very abundant in this vicinity, and its work can be seen in any fruit yard. It deposits its eggs in the peach, the grape-vine, the currant, the raspberry, and the common elder, to my certain knowledge. In almost every case, the branch dies beyond the point where the eggs are inserted, and many persons on this account deem the work of the insect injurious; but in most cases, perhaps, it amounts to nothing more than a proper shortening-in of the branch. I kept portions of vines in which the eggs had been deposited, in a drawer of my writing desk last summer, until finally, on May 20th, the young insects made their appearance.

I shared in the popular prejudice last summer to such an extent, that I destroyed thousands of the *Œcanthus* eggs; and either from that cause or from some peculiarity of the season, their work is quite scarce this spring on my own premises. I shall be sorry enough for my crusade against them, if it turns out that they are aphis-eaters.

TREE CUT-WORMS.

Mr. Riley of Chicago, has favored me with specimens of the species bred by him from his "dark-sided cut-worm;" and it does not belong, as I anticipated, to the genus *Hadena*, but to *Agrotis*. It is very remarkable, however, that the species which has been, perhaps erroneously, named for me as *Hadena chenopodii*, and which has the male antennæ perfectly unfeathered, (i. e. not "bipectinate,") so closely resembles Mr. Riley's species in its markings, that at first view they appear to belong to the same species. Yet, as it turns out, they do not even belong to the same genus.

B. D. W.

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[*] See Dr. Fitch's *N. Y. Report*, III, p. 260, "Errata."

[†] *Ibid.* p. 5.

QUACKS AND PHYSICIANS.

The difference, as I take it, between a Physician and a Quack is simply this, that the former always wants to find out what your disease really is, before he prescribes for you, and then varies his prescription according to the nature of the disease; while the latter does not trouble his head for one moment, to ascertain whether you are afflicted by Gout or Cancer, by Neuralgia or Dyspepsia, by Inflammation of the Lungs or Palpitation of the Heart, inasmuch as his Infallible Golden Elixir is warranted to cure all diseases that the Human Species is subject to.

As with the diseases of men, so with the diseases of plants. We often see men prescribe for plants that are infested with some insect or other, without taking the least trouble to ascertain what particular species of insect is doing the damage. As the habits of different insects differ very greatly, it is consequently all haphazard whether the proposed remedies can do any good or not. I find the following example of this "hit or miss" method of prescribing in that excellent Journal the *Western Rural* for March 30, 1867.

> REMEDY FOR ROSE INSECTS.
>
> Can you, through the columns of the *Western Rural*, give any plan for preventing the destruction of roses by insects? A little black insect has destroyed our roses for the past two seasons, by eating the buds just before blossoming. A. E. R.
>
> *Fayette, Iowa.*
>
> Remove the soil from around your rose-bushes to the depth of four or five inches, and the width of one and a half or two feet, and scatter it thinly over the surface of the garden, or pleasure ground, that the larvæ of injurious insects which it contains may be exposed to destruction. Fill the excavation with rich compost, in which well-rotted cow-manure forms the principal ingredient. This will increase the vigor of the plants and enable them to withstand the attacks of insects. It will be found that unhealthy plants suffer most from the rose-bug, the slug and other pests. Dusting the leaves with ashes or road-dust has been found beneficial, also syringing them with soap-suds. The syringe is more suitable than the sprinkler; with it the insects on the under sides of the leaves can be reached.

What the "little black insect" spoken of by A. E. R. really be, it is impossible to say with any certainty; but likely enough it is nothing but the common Plant-louse of the Rose, (*Aphis rosæ*). In this case "removing the soil from around the rose-bushes" will not kill a single one of the pests, because that insect never goes under ground in any of its states. Certainly it cannot be the common Rose-bug (*Macrodactylus subspinosus*), that is afflicting A. E. R.'s bushes; for that insect is yellow, not black. Neither can it be the common Slug-worm of the rose, (*Selandria rosæ*), for that larva feeds on the fully-expanded leaves, and does not gather more peculiarly on the unexpanded tips of the twigs, as does the Plant-louse of the rose. I am acquainted with the larva of a small moth, (probably a species of *Argyrotoxa*), which in particular seasons bores the unexpanded flower-buds, especially of moss-roses, till nothing is left of them but a mere shell. But that larva is rather green than black; and if the *Western Rural* knows that it goes under ground to transform, it knows more than I do.

It is very true, that if the insect complained of be really a Plant-louse, "syringing the bushes with soap-suds" will probably be beneficial. But on that supposition, why impose on A. E. R. the additional labor of removing so much soil? Prescribing after this blindfold fashion is a good deal like pouring into the stomach of a human patient, who may perhaps be troubled with a cold in the head, remedies to cure the Gout, and remedies to cure the Itch, specifics against Rheumatism, and specifics against the Measles, and a variety of other medicines to operate specially upon the Lungs, the Heart, the Kidneys and the Liver. B. D. W.

THE EPHEMERON OR MAY-FLY.

It is popularly supposed that this insect lives only a few hours, or, as the Greek etymology of the word "Ephemeron" denotes, only a single day. So far as regards the perfect insect, this is true of certain species belonging to this Family; though it is recorded by authors, that other species live several days in the Perfect or Fly state; and I have myself kept one of our largest species—the *Palingenia bilineata* of Say—alive in my breeding-cages for nearly a week. But although in the Fly state the duration of life is very short, yet in the larva or grub state most of these insects live nearly a year, and some of them, as is said, nearly two years, all of them without exception inhabiting the water during that stage of their existence. Hence the beautiful and well known reflections, which Dr. Franklin puts into the mouth of "the ancient Ephemeron that had actually lived 370 minutes," however instructive they may be in point of Morality, are incorrect and untrue in point of Natural History. B. D. W.

A GROUNDLESS FEAR.

We clip the following item, with the accompanying editorial remarks, from the *Monthly Report* of the Agricultural Department, for February, 1867, (p. 62).

> *Dixon, Ill.*—"Last year I had some very fine asters, and a long, slim, black bug destroyed them by eating the flower. In the morning I would kill them, and before evening another swarm would literally cover them. I saved a few seeds, but do not like to plant them, for fear I might be propagating the bug."
>
> [The insect injuring the asters is probably the *lytta*, a species of the *cantharidæ*, and which is very injurious to the aster.]

The particular species was no doubt the Black Blister-beetle, (*Lytta atrata*), which I know to be peculiarly hard on Asters, and which sometimes also attacks the potato plant. (See the PRACTICAL ENTOMOLOGIST, II, p. 26.) The gentleman at Dixon need not be apprehensive of propagating the "bug," or properly speaking, "beetle," by planting his aster seed. Its eggs are not laid upon the seed of the aster, nor upon any other kind of seed, but in the earth. And it is in the earth that the larva exclusively lives; feeding upon the roots of various plants, until it is ready to come out into the light of day, in the form of the perfect Beetle.

B. D. W.

USE OF NATURAL HISTORY.

A correspondent of the *Scientific American* paid a visit in 1862, to Col. Pike, of Brooklyn, N. Y., an amateur naturalist. During the visit, the Colonel said: "I am very frequently asked what is the use of this study of natural history. Some of our very intelligent citizens say to me, 'How are you going to make anything out of this? What good does it do to catch butterflies?' Not long ago, I saw one of the wealthiest men in Brooklyn at work on the trees in front of his house. He had them all scraped and whitewashed at an expense of $80. Said I, 'Mr. Hunt, what are you doing that for?' 'To keep off the worms,' he said. 'That's no use,' I remarked. 'Oh,' said he, 'I think it is.' Well, now, the insect was a *Geometra*, or measuring-worm; the moth that produces these worms, lays its eggs on the ends of the branches, and it is almost impossible to kill the eggs. The strongest Northwest winds have no effect upon them; I have seen them in Maine, and it is difficult to crush them with your nail. When they hatch in the spring, the young worm eats off the tender leaves. You can judge what good the scraping of the trunk would do. I went by some months afterward, and Mr. Hunt was in front of his house, looking up at his trees, which had not a leaf on them, and I remarked, 'Your trees are looking finely, Mr. Hunt; the scraping was more profitable than hunting butterflies.'"

FIRE-BLIGHT.

A correspondent inclines to believe, that Downing's Theory of Fire-blight, namely, that it is caused by frozen sap, is the true one. There is a remarkable fact which seems to show, that Downing's Theory cannot be the true one. On the continent of Europe, they have, in many countries where Pear and Apple-trees are commonly grown, just as severe frosts as we have and just as sudden changes in the weather. Yet there is no such thing as Fire-blight known there. The same reasoning applies to another hypothesis, which has been recently broached by Mr. Bennet, of Pittsburg, namely, that Fire-blight is caused by thunder and lightning. The facts seem to indicate that it must be caused either by some insect peculiar to America, or by some parasitic fungus peculiar to America; for on no other supposition can we readily explain, why it should not prevail in any part of the Old World.

If I may be allowed to hazard an opinion, or rather a guess—what is known as "Leaf-blight," i. e. a vast number of dead, brown-colored spots on the leaves, causing them to fall prematurely, is produced by a pale-green Leaf-hopper (*Chloroneura malefica* Walsh), of very nearly the same shape and size as the Grape-vine Leaf-hopper, (figured Practical Entomologist II, p. 51.) And what is distinguished as "Frozen-sap Blight," is produced by a minute parasitic fungus. But the subject is a very difficult one, and requires further and fuller investigation. B. D. W.

ANSWERS TO CORRESPONDENTS.

C. F. A., N. J.—In criticising an Article on Black-knot which appeared in the last number of this Journal, (p. 63), you say that you have "examined the Black-knot from the Wild Cherry, the Morello Cherry, and the cultivated Plum, and published an account of it in the *American Agriculturalist* for March, 1863, and found it in all cases to be identically the same Sphæria morbosa." "The Wild Cherry!!" Even if you had not known it before, you might have found out from the article which you attempt to criticise, but which you have evidently never read through, that there are no less than three perfectly distinct kinds of Wild Cherry trees common to the United States. I prefer not to accept as conclusive, on so difficult a botanical subject as the identity of two or three apparently distinct funguses, the evidence of a Botanist who does not know that there is more than one kind of Wild Cherry tree in America, or at all events confounds together, under such indefinite phraseology as "The Wild Cherry," species which, in such a question as this, ought to be carefully distinguished.

As to your notion that what is mistaken for Black-knot on cultivated cherries is almost universally caused by firing with shot at the birds, and thus injuring the twigs, Mr. Hicks informed me that he had not molested the birds for years on his grounds, and yet it seems that his Cherry trees were full of Black-knot in 1860. Consequently this strange new theory of yours will not hold water. Besides, you say that people in your neighborhood "are constantly complaining that they cannot raise any cherries because of the knots, some of which are as large as a man's fist." If then they do not raise any cherries, what occasion can they possibly have to fire into their cherry trees? Are they afraid that the robins will eat the black-knots?

Wm. Willock, N. Y.—The long rows of punctures, each puncture containing an elongated egg, on the twigs of the Delaware grape-vine, are produced by the common Tree-cricket (*Œcanthus niveus*). They are the same spoken of in the Answer to J. M. Cole, of Missouri, Practical Entomologist, II, p. 74; and for advice what to do with them, I must refer you to that Answer. The single grape twig with several old scars on it, seems to have formerly had the eggs of some Tree-hopper (*Membracis* family) deposited in it; but I cannot be sure of the fact in so old a specimen.

J. B. H., C. W.—The large moth expanding nearly eight inches, which you hatched in a warm room from a tough silken pod-like cocoon attached to the twig of an apple-tree, can be nothing else but the Cecropia moth, (*Attacus cecropia*), as you say that the body was "striped." In this insect the abdomen is cross-barred with alternate bands of white, black and red, while in the only other common moths which are large enough to answer your description, (*Attacus polyphemus* and *A. luna*), the abdomen is respectively ochre-yellow or white, without any cross-bands. Its disappearance from the room in which it was confined, "leaving a portion of its wings neatly cut off," was probably due to some mouse or rat having made a meal of it. When hatched out in the natural manner, this moth flies well enough with a lazy flapping flight. The eggs it laid will produce nothing, as they were not impregnated by the male moth. You will find excellent figures of this insect and of its cocoon and pupa in Harris's *Injurious Insects*, pp. 387–9. The "thick yellowish jelly-like substance," found in the pupa that was inside the other cocoon, is what is usually met with in undeveloped pupæ.

M. W. Philips, Mississippi.—The specimens of pear-twigs "varying in size from a pen-holder to a man's thumb," from which the tip end had been severed by the jaws of some insect, are, as you correctly remark, precisely similar to oak-twigs amputated in the same manner by the Oak-pruner (*Elaphidion putator*). Whether similar work which you have noticed on Hickory and on the English or White Walnut, and which Dr. Fitch also noticed on the Beech, be produced by the same species remains to be proved. As there are several closely allied species of *Elaphidion*, I should rather guess that each distinct species confines itself to a distinct tree: but possibly it may not be so. The subject is well worth a careful inquiry.

J. M. Tracy, Michigan.—The blister-beetles you send, which arrived in excellent order, are the *Lytta ænea* of Say, a species so closely allied to *Lytta Sayi*, which devours the young pear itself, that some have doubted whether the latter be not a mere variety. Respecting this last, see PRACTICAL ENTOMOLOGIST, II, pp. 32-3. To avoid confusion, the term "*Cantharis*" is now generally dropped for the genus containing the Blister-beetles, because certain authors had applied this name to another very distinct genus of beetles now known as "*Telephorus*." As the facts you mention respecting the operations of this insect are quite new, I will transcribe them for the benefit of the general reader.

"These beetles are doing considerable injury to the orchards near South Pass, Mich., and were first observed on the 19th of April, eating the blossoms of the pear. They always commence their meal by eating the corolla of the flower next the pistil and calyx, and often the just formed fruit; though they do not seem to relish the latter and never eat the whole of it. Under no circumstances will they touch the stamens. If reduced to short commons, they will nibble a little on the tender young leaves. They work most at the top of the tree and at the extremities of limbs. Their number is great; sometimes more than a hundred are found on one small tree. None of the trees on which I have seen them exceed eight years standing. Cherry trees are also peculiarly subject to be attacked by them; nor do plums or quinces escape. On apple and peach trees they have not been observed.

"The jarring process is as effectual against these fellows as against the Curculio. A very slight jar causes them to 'play possum' and fall. Early in the morning, while it is cool, they will remain dormant for some minutes; but in the heat of the day they are soon up and off."

There is another Blister-beetle of about the same size and shape as *ænea* and *Sayi*, which I have always met with on the blossoms of the wild plum, and which will probably be found some day or other to be destructive to the blossoms of the tame plum. This species was described by Mr. Bland, from specimens furnished by myself, as *Lytta tarsalis*. The three may be readily distinguished one from the other by the following table; and they are all of them nearly of the same size, shape and make as the Blister-beetle figured in PRACTICAL ENTOMOLOGIST, II, p. 26, but are not striped as that is.

A. Head, thorax and wing-cases all colored alike.
  a. Head, thorax and wing-cases all downy...**L. tarsalis.**
  b. Head, thorax and wing-cases all smooth..**L. Sayi.**
B. Head and thorax differently colored from the wing-cases. (Head and thorax downy, wing-cases almos smooth......................**L. ænea.**

In all these species the legs are red, with the knees and more or less of the feet (tarsi) black. The three have been referred by Leconte to his genus Pomphopœa—which is one of many genera into which the very extensive old genus *Lytta* has been subdivided.

Henry Morey, Ill.—On the closest examination I can detect no positive signs of insect life in the specimens of apple-tree bark which you send. Even if the powdery appearance under the thin outside skin of the tree be the work of some unknown insect, you need not trouble yourself about it, as it evidently, just as you state, never penetrates any depth into the bark. There is no "borer," properly so called, working in this manner, but there are several minute bark beetles that do; none of them, however, are materially injurious to trees. I cannot tell, without seeing the specimen, to what insect the row of eggs found on an apple-tree limb belonged.

Dr. C. Greene, Ohio.—I cannot believe that the application of Gypsum, or of any other powder, to the flowers of a plum-tree would have the least effect in preventing the "Curculio" from laying its eggs in the fruit. Neither do I believe that any fumigation of the flowers with offensive odors would have any such effect. Dr. Trimble has shown that all kinds of offensive compounds, even when daubed upon the plum itself, fail to keep off the "Curculio."—The grubs found under the hide of living oxen arise from eggs deposited there by a large two-winged fly—*Œstrus bovis*— belonging to the same family as the fly which produces the Head-maggots in sheep, and another which produces the bots in horses. Another still larger fly belonging to this family, which has the size and the general appearance of a large Humble-bee, deposits its eggs in the neck of our common rabbit, and the larvæ arising from these eggs produce very extensive tumors in the affected part.

Peter Ferris, N. Y.—The second batch of eggs arrived safely, but some few of the larvæ had already hatched out on the road. I notice that Dr. Fitch says that the web-nests of *Clisiocampa sylvatica* are very commonly overlooked, "even though diligently sought, being of so slight a texture and placed along the side of the trunk or of one of the larger limbs of the tree and hereby rendered inconspicuous." (*N. Y. Rep.*, II, §. 321.) The larvæ hatched from the first lot of eggs have already spun slight webs. "The other eggs on one of the twigs" are those of the common Apple-tree Plant-louse, which is going to be very destructive and abundant this year. They had hatched out all of them on the road.

S. Siewers, Iowa.—You can get insect pins of James W. Queen & Co., Philadelphia.

NOTICES.

The **American Bee Journal** is published monthly at Washington, D. C., in octavo form, so as to make annually a handsome volume of 240 pages. It contains a vast amount of valuable information on the practical management of Bees, partly from American correspondents and partly translated from the numerous periodicals on the same subject which appear in Germany and other parts of Europe. The price is $2 per year. We can only suggest one improvement to the Editor. The gigantic Drone Bee, of which a wood cut is given on the wrapper, is of very impure breed and should be replaced by something truer to nature. It must be a cross between a Blue-bottle-Fly and a Honey-bee; for it has only got two, instead of four wings; and instead of the regular and definite pattern of vein-work found on the wings of every honey-bee without exception, the artist has given us a system of vein-work such as is found in no insect whatever that God ever made upon the face of this terrestial globe.

The **Farmer's Advertiser** is a 16-page quarto journal, which appears bi-monthly at St. Louis, Mo., at $2 per year, payable in advance, and is exclusively devoted to such matters as concern the Agricultural interest. It is well printed and edited, and the Market Reports are peculiarly full and instructive, exhibiting in a tabular form the separate price of each article for the three preceding weeks, so that the farmer can see at a glance whether the market is rising or falling for anything that he has to sell.

The **Massachusetts Teacher** is published monthly in octavo form, at Boston, so as to form annually a handsome volume of nearly 450 pages, at the low rate of $1 50 per year, payable in advance. Although this Journal is chiefly, as its title indicates, devoted to educational subjects, yet it occasionally contains matter of much interest to the Farmer and the Gardener. Judging from the advertisements stitched up along with it, it must have a very extensive circulation.

The **Horticulturist** is an old established Monthly of twenty-one years standing, and is published in New York at $2 50 per year, the twelve numbers making an octavo volume of nearly 400 pages. It is very copiously and handsomely illustrated, and is well printed and edited.

The **Gardener's Monthly** is published in Philadelphia, in the same form and style as the above, at $2 per year. The well-known name of the Editor—Thomas Meehan—is a sufficient guarantee that nothing but what is practically valuable shall find admittance into its columns.

The **New England Farmer** is an excellent Weekly Newspaper, devoted in large part to Agricultural matters, and published in Boston at $2 50 per year, payable in advance. To New England farmers it is peculiarly valuable, and being now in the twenty-first year of its existence may be considered as having attained years of discretion.

The **New England Homestead** is a new quarto 16-page Agricultural Journal, published every month at Northampton, Mass., at the ridiculously low price of *fifty cents* per annum. It is well printed on paper of fair quality, and edited with talent and judgment. How the publishers can afford it at such prices, unless they steal their paper and borrow the use of their types, we do not know; but there seems to be no limit to Yankee ingenuity and progressiveness.

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Insects and their Allies, (*with illustrations.*) By A. S. Packard, M. D.

The American Silk Worm, (*with illustrations.*) By L. Trouvelot. Continued.

The Land Snails of New England, (*with illustrations.*) By E. S. Morse. Continued.

Reviews.—Preliminary Report of the Geological Survey of Kansas, by G. C. Swallow. Annual Report of the Smithsonian Institution for 1865; The American Journal of Conchology.

Natural History Miscellany. Botany.—The Tertiary Flora of Brognon, France; Drying Plants by Heat—two methods. *Zoölogy.*—Flights of Butterflies. *Geology.*—The First appearance of man on our Planet; The Eozoon in Austria.

Correspondence.—Wasps as "Marriage Priests" to Plants. *Illustrated.*

Natural History Calendar.—New England Reptiles in April; Ornithological Calender for April; The Insects of Early Spring.

Proceedings of Scientific Societies.

Glossary for the Number.

Contents of Vol I, No. 3, May, 1867.

Some Errors regarding the Habits of our Birds. By Dr. T. M. Brewer.

The Food of the Sea Urchin. By J. W. Dawson, LL. D. *Illustrated.*

The Moss Animals, or Fresh-Water Polyzoa. By Alpheus Hyatt. Continued. *With a plate.*

The Land Snails of New England. By E. S. Morse. Continued. *Illustrated.*

The Tarantula Killers of Texas, (*with a cut.*) By G. Lincecum, M. D.

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The American Silk Worm. By L. Trouvelot. Concluded. *With two plates.*

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Natural History Miscellany. Botany.—The May Flower; The agency of Insects in Fertilizing Plants. The annual increase in the Circumference of Trees. Curious Flower. *Zoölogy.*—A new Insect Box. (*Illustrated.*) Parasites of the Humble Bee; Habits of Carpenter Bees; Mimetic Forms among Insects. *Geology.*—The absence of the Northern Drift Formation from the Western Coast of North America. *Microscopy.*—Test objects; Diatoms; Methods of teaching Science.

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As letters still pour in from parties desiring to obtain the Works advertised for sale by me, in the October (1866) number of the *Practical Entomologist*, I hereby give notice that *all* of the Books I advertised, were disposed of soon after the issue of the number containing the advertisement. GEORGE HILL.

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PHILADELPHIA, JUNE, 1867.

THE WHEAT MIDGE.

[From a letter from S. S. RATHVON, Penna.]

Enclosed, I send a small box, containing what I take to be the larvæ of the "Wheat Midge, (*Cecidomyia tritici*), sent to me by an intelligent farmer from the northwest part of Lancaster County, Penna. They were obtained from the low, flat portion of a wheat-field on his farm, under the following circumstances. After a heavy rain, on the 15th of May, he found on this low portion of the field, which had been overflowed by the rain, after the waters subsided, an orange or sulphur-colored covering, which he did not immediately examine, but could not account for. In the afternoon of the same day, or the morning after, he went to the place where he saw this yellow substance, with a view of obtaining some of it for examination, but was surprised to find that it had all disappeared. He noticed, however, that the whole flat and smooth surface where it had previously existed, was punctured by thousands, perhaps millions, of small holes, about the size of an ordinary pin hole. On digging about half an inch beneath the surface, he found the larvæ, which I transmit, in countless multitudes, but met with very few of them any where else in the field, and on the higher portions none at all. The field in which these larvæ occurred bore a crop of wheat last year.

REMARKS BY B. D. W.—Mr. Rathvon is quite right in supposing the larvæ, met with under these extraordinary circumstances, to be those of the common Wheat Midge, *alias* Milk Weevil, *alias* Red Weevil. The Natural History of this insect may be thus briefly disentangled from the mass of misconceptions in which it has been involved by certain writers.

The fly makes its appearance in June, a little earlier or later according to the latitude and the season, or to be more precise, it comes out about the time when wheat is in flower. It then deposits its eggs upon the ears of the wheat, and these eggs hatch out into little orange-colored maggots, about eighth inch long when full grown, which suck out the juices of the future kernel and cause it to shrivel up more or less, according to the number of larvæ at work on it. By the time the grain is ripe, the maggots have become full-fed, and the great bulk of them descend to the earth, where they burrow a few inches underground, and not long afterwards construct there, each for itself, a filmy cocoon, more delicate than the finest gold-beaters' skin, gluing it to the surrounding grains of earth so that the whole has the appearance of a little ball of earth. Within this cocoon, according to the practice of all the numerous Willow Gallgnats belonging to the same genus *Cecidomyia*, the History of which I have detailed in the *Proceedings*, the insect remains in the larva state without eating anything all through the winter, and until within a few weeks of the time when the perfect Midge is destined to appear, i. e., with this particular species, until some time in May. It then changes into the pupa state, and some time in June works its way out of its cocoon and to the surface of the ground; for which purpose all the pupæ in this genus are provided with little thorns on the base of their antennæ, varying in length and sharpness according to the species, and the more or less dense substance that they have to penetrate in order to emerge to the light of day. Having reached the surface of the ground, the shell of the pupa then bursts open in front, and the winged fly crawls out, the wings being at first short and stumpy, but rapidly expanding and growing into their natural size, as is also the case with moths, &c., when they first come out of the pupa. As with almost all the species of the genus, the females are very much more numerous than the males; so that it is not improbable that some females deposit fertile eggs without any intercourse whatever with the opposite sex. At all events, this has been proved to take place in certain other groups of insects.

The above may be considered as the normal life of the Wheat Midge. Some individuals, however, instead of going under ground, construct their filmy cocoon in the ear of the wheat, where they passed their larval existence, attaching it very slightly, and usually at one end only, to the chaff of the ear. This cocoon fits so closely to the body of the larva that, being transparent, nothing can be seen of it but the small portion of it that projects at one end beyond the body of the larva. In this respect it agrees exactly with the cocoon of a Willow Gallgnat, (*Cecidomyia s. brassicoides*), which I have described, and of which I have closely examined many hundred specimens; and no naturalist, who compared the two together, could hesitate for one moment in pronouncing that the two are of precisely similar nature. In both cases, if the larva is allowed to remain undisturbed, it remains within its cocoon; but in the case of the Wheat Midge, when the wheat is thrashed, or when a few infected ears are rubbed out in the hands, that portion of the cocoon by which it was slightly attached to the chaff of the ear, sometimes becomes ruptured. Then, and then only, the larva crawls out of its house, being apparently unable to repair the damage to the old cocoon. Many other insects will do the very same thing.

Upon this slender foundation of facts, a mythical theory was based by certain American authors, namely, that it was the "skin" of the insect, and not its cocoon, that under these circumstances it crawled out of; and that it was the normal habit of the larva to moult its "skin" in the ear of the wheat, and then go under ground and pass into the pupa state, without forming any cocoon whatever. Whereas it is contrary to all entomological analogy, that any larva should moult, after it is full fed, until it gets ready for the final moult into the pupa state; the various moultings of the larva being only performed for the sake of allowing its body to grow larger, and any larval moult after it is full fed being utterly causeless and unnecessary. And, moreover, it has since been clearly proved by Dr. Fitch, that the larva of the Wheat Midge does really, whenever it goes under ground to transform into the pupa state, form a filmy cocoon in the manner described above. (*N. Y. Rep.* III, pp. 60-1). Hence it is but reasonable to infer that, if the insect makes a cocoon when it goes under ground, it will also make a cocoon in the comparatively few and exceptional cases, when it stays above ground and transforms in the ear of the wheat.

A few cases have been noticed in Europe, where the larva of the Wheat Midge transforms into the pupa state in the ear of the wheat the same season, and comes out into the fly state the same season, instead of lying dormant till the following summer. I am not aware that any such cases have been actually observed by practical entomologists in this country, but there is reason to think that in America, as well as in Europe, this occurs occasionally. In the same manner most of the Canker-worm moths come out in March, but some few make their appearance the preceding autumn. And so with many other insects.

The practical inference to be drawn from our examination into the Natural History of this insect is, that whenever wheat known to be infested by the Wheat Midge is thrashed and winnowed, the "tailings" should always be either scalded or burnt up. They will almost always be found to contain a great number of the larvæ of the Wheat Midge, most of them still enclosed in their tight-fitting filmy cocoons; and these, if allowed to live, will probably produce Flies next June to re-stock the farmer's wheat-fields with this destructive pest.

As to the specimens sent me from Pennsylvania by Mr. Rathvon, they were all, so far as I could see, naked and without any enveloping cocoon, or so-called "skin." I explain this fact in the following manner: The violent swash of the waters broke up a certain percentage of the cocoons that it disinterred, washing away the coating of earth and rupturing the delicate membrane that remained. Hereupon, as is their habit, the larvæ crawled out of their desolated houses, or were washed out of them by the flood, and floating above the heavier particles of earth carried along by the water, formed an orange-colored scum on the surface, after the waters subsided. On the other hand, such cocoons as did not have the coating of earth washed away from them, would be apt to settle down lower in the mud left by the flood; or even if they remained on the surface, would escape notice on account of their being of the same color as the mud. When the naked larvæ revived from their half drowned state, they naturally burrowed under ground, by way of effort to attain a position where they could safely pass into the pupa state. I doubt very much whether nature would enable them to form a new cocoon under ground; and in default of the natural protection from excessive drought or excessive moisture afforded by that cocoon, I doubt also whether such individuals will ever succeed in attaining the Fly state. Possibly some few may do so, as the time is but short which they will have to bridge over between the Larva and the Fly state. But I do not believe that many will.

The reason, in all probability, why but very few of these conspicuous orange colored larvæ were met with anywhere else in the field, except in the hollow that had been flooded, and on the higher portions none at all, is because they were only visible to the eye when they were washed out of their earth-colored cocoons by the flood of waters. Dr. Fitch has remarked that it is "almost impossible to discover these cocoons, even with the aid of a magnifying glass, where they lie in their natural situation in the ground of old wheat-fields." (*N. Y. Rep.* III, p. 61.) Hence it would be a very unsafe inference to arrive at, that because the orange colored larvæ were only seen by the farmer of Lancaster Co. in certain portions of his field, therefore there were none in the remaining portion. Mr. Rathvon tells me that he recommended the farmer "to plow down immediately the most infected portion of the field with a deep subsoil plough," of course with the idea of burying the larvæ beyond any hope of resurrection. The advice was probably good, but to be on the safe side, the whole field should have been subsoiled. For just as likely as not, there were full as many larvæ on the uplands as on the lowlands; only in the latter case they were exposed to the eye, in the former case they were hidden from view in their earth-colored cocoons.

Mr. Rathvon seems to think it a strange thing that the larva of the Wheat Midge should, as a general rule, remain in the larva state, without eating anything, from July to the following May. But it should be recollected that for the greater portion of this time it is enclosed in a cocoon, which, although filmy and thin to the last degree, is yet to all appearance impervious to water, and must therefore check evaporation almost totally. Besides, many other insects do precisely the same thing. I have often had the larva of the gigantic Saw-fly of the elm (*Cimbex americana*) spin up early in July; yet as Dr. Harris observes, and as I know from my own observation, the insect remains in the larva state in its tough pod-like silken cocoon all through the winter and until the following spring, without the possibility of its obtaining any food there. (Harris, *Inj. Ins.*, p. 519.) Hence Mr. Rathvon's query, that "there may be some substance under the earth upon which the larva of the Wheat Midge could feed during the long summer," must be answered in the negative. Even if there were some such substance, how could they reach it, when each is bottled up tightly in his cocoon, and has to remain there until June in the following year?

THE NEW, OR COLORADO POTATO BUG.

Since my last article on this insect was published, I have collected a few additional facts regarding its geographical distribution, &c., which it may be worth while to lay before the reader.

Mr. T. T. Smith, of St. Paul, Minnesota, noticed it at that place in 1866. "They troubled the Peach-blow Potatoes," he tells me, "very little, but almost entirely stripped the leaves from the St. Helenas." We had not previously heard of it in this State. I had long ago showed that it had passed from Nebraska into Iowa; but how extensively it prevailed in Nebraska, I have not been able to ascertain.

The Editor of the *Wisconsin Farmer* (April 13, 1867), finds that it was in Grant Co., Wisc., which lies in the extreme South West corner of the State, as early as 1862, and that it was abundant on the St. Croix river, which bounds the State on its North Western border, in 1865. Mr. Townley, of Marquette Co., Wisc., which lies a little South of the central part of the State, writes me word that it existed in that neighborhood in comparatively small numbers, in 1865, and swarmed there in 1866. Already in 1865 he had heard that "there was a bug, which, for two years at least, had been making havoc with the potato plant in the region West of Marquette Co., and that it was considered to be making its way thitherward." Hence we may infer that this insect invaded Wisconsin some two years before it invaded Illinois; i. e., in 1862 instead of 1864; which is in accordance with the general principle already laid down by me, namely that the Southern columns of the Grand Army have uniformly lagged behind the Northern columns, as they marched Eastward towards the sea.

According to a letter from Mr. Byers, of Colorado, which was recently published in the *Wisconsin Farmer*, the Colorado Potato Bug is found only in comparatively small numbers upon the Potato-plant in that region. This is in accordance with what, reasoning *a priori* upon general principles, we should naturally anticipate. The Rocky Mountain region, as I long ago demonstrated, is the native home of this insect; and as many species of insects occur in that country which are not found further East, it is not improbable that some cannibal or parasitic insect preys upon it there extensively, which is not met with in the Valley of the Mississippi. Wherever any animal has existed for indefinite ages, there the Balance of Life has been gradually adjusted, until by natural causes that animal is controlled and kept within reasonable limits. When this same animal suddenly migrates into a new country, it is generally unaccompanied by the species that had preyed upon it in its native home; and until the System of the Creation has been slowly and gradually modified, so as to originate a new Balance of Life—which process will probably occupy a very long time—it will often run riot and sweep the whole country before it. We have but to recur to the well known history of the Hessian Fly, the Wheat Midge and the imported Apple-tree Bark-louse, to see how these principles have already operated in the United States.

To sum up all the known facts in a few words. This Colorado insect now occupies more or less completely Kansas, Nebraska, Iowa, Minnesota, Wisconsin, Illinois and Missouri. I shall be greatly deceived if we do not hear of it in Indiana, and perhaps in Michigan, during the season of 1867.

Mr. Tilden, of Davenport, Iowa, (the author of the Tilden Tomato), says that he lost 30 acres of potatoes in 1866 by this insect, and hardly feels like going extensively into the business again. (*Prairie Farmer*, April 6, 1867). Mr. Suel Foster, of Muscatine, in the same State, thinks that they will have to give up growing potatoes in that region of country, and depend for their supplies of that vegetable upon those districts which have not as yet been invaded by the Bug. For himself, he says that he does not propose to plant any potatoes at all in 1867, except a few early ones, which he intends to start in a hot-bed, and try to hurry forward to harvest by the 4th of July. (*Ibid*, Jan. 26, 1867).

The general result of all the evidence is precisely what I stated in the first instance, when for the first time, in the first number of this Journal, I laid open the Natural History of this insect.

There is no instance on record where, having established itself in any settlement, it afterwards leaves that settlement and passes on elsewhere or disappears. Colonies are from time to time pushed forward in all directions, especially towards the unoccupied region that lies to the eastward. But the old original homestead is never deserted. Farmers and others will govern themselves accordingly. On the whole, I am satisfied that in a region of country which has been already fully occupied and possessed by this little pest, it will not pay to attempt to grow potatoes in towns and thickly settled sections, where one is surrounded by neighbors who plant potatoes, and think it too small business to make war upon such an insignificant creature as a Bug. In that case, no matter how much pains the farmer may take to clear his own vines, fresh armies will be perpetually invading him from the fields of his less diligent neighbors, and finally he will have to give up in despair, and own himself beaten. The best chance is where a farm is located several miles from any potato-growing neighbor. In such a situation Mr. Brown, of Woodbury Co., Iowa, states that he raised a moderate crop in 1866, in spite of the Bug. "As soon as the first rows could be seen," he says, "the bugs were found on nearly every plant. A day's work at this time, before eggs are laid, is equal to weeks of work later. [Yes, for these are the ones that have passed the winter underground, and start the first brood. B. D. W.] These earliest bugs were picked closely, but for the first week they increased. After this eggs were found, but the bugs decreased in number, with each picking. A small black-winged yellow bug appeared soon after eggs were found, and fed upon them, rendering valuable assistance. [Probably some species of Ladybird. B. D. W.] The good bug was kindly treated. There were scarcely any potato-bugs seen after the 1st of July, but all that were seen were destroyed." (*Ibid*, March 9, 1867).

The Law lays it down as a general rule, that a man must so use his own property as not to damage his neighbor. But the Law does not always practice what it preaches. If it did, it would prohibit every man from keeping cattle which are notoriously breachy. If it did, it would inflict capital punishment upon all the sheep-killing dogs in the country. If it did, it would make it a penal offense to allow a single Canada thistle to run to seed. If it did, it would not permit a slovenly orchardist to grow, every year, millions of the moth which produces the "Caterpillar" of the Apple-tree, so as to stock the whole country with hundreds of millions of "Caterpillars" next season. If it did, it would compel every fruit-grower to gather up and destroy all his wormy fruit, so that his neighbors might not be plagued next year with the Curculios which he has raised. If it did, it would prohibit every man from growing potatoes in the infested district, unless he destroyed all the Potato-bugs that he raised, so that they should not trouble his neighbor. But we must console ourselves with the reflection that this is a free country, and that every free-born American citizen claims the privilege of making himself a public nuisance, as often as he chooses, and to as great an extent as he chooses. B. D. W.

ANSWERS TO CORRESPONDENTS.

M. W. Philips. Mississippi.—The little thorn-like, conical, green "galls," about ¼ inch long, growing in bunches of three or four from the under side of the leaf of the "Texas Mustang" Grape-vine, are made by some undescribed species of Gall-gnat (*Cecidomyia*). I formerly received very similar ones from Mr. Foster, of Pennsylvania, which grew on the Isabella grape-vine, a cultivated variety of the northern Fox grape. (See PRACTICAL ENTOMOLOGIST, Vol. I, p. 101.) Whether the two are identical, I should not like to decide positively, but I incline to think that they are not. The general rule—to which, however there are numerous exceptions—is that each species of gall is confined to a distinct species of plant: and even when the same gall occurs on distinct species of plants, those species invariably belong to the same botanical genus. There are whole hosts of these "galls," as naturalists call them, or unnatural growths of every conceivable shape, size and color, made by insects belonging to many different Orders. The great bulk of those found in the United States are at present undescribed and unknown to science. Baron Osten Sacken enumerates no less than 58 species made by different species of Gall-fly (*Cynips*) on different species of Oak, and I am myself acquainted with many others which are undescribed. The well known "Oak-apples," which grow exclusively on the Black Oak, are a familiar example of a "gall;" and there is another very distinct kind of "Oak-apple" growing on the Red Oak, which differs in containing no spongy substance inside it, the central cell, in which the larva of the Gall-fly lives, being only connected with the skin of the Oak-apple by regularly radiating filaments, instead of the interval between the two being filled up with dense brown sponge. Both the above galls are made by a Gall-fly (*Cynips*, Order Hymenoptera.) Other galls on other genera of plants are made by Sawflies (*Tenthredo* family in the same Order). Others by Plant-lice (*Aphis* family, Order Heteroptera). Others by small moths (Order Lepidoptera). Others by different groups of two-winged flies (Order Diptera), and especially by the Gall-gnats (*Cecidomyia*), all of which are slender, long-legged insects, having much the appearance of a common Musketo, except that they lack his long blood-thirsty beak. In every case the larva or larvæ of the parent fly lives inside the gall, deriving nourishment from the unnatural growth which is technically termed a "gall." In the case of the Plant-lice, the mother insect lives and propagates inside the gall, bringing forth alive therein a numerous progeny of young plant-lice. One gall of this kind, shaped somewhat like a cock's comb, is very abundant on the upper surface of the leaves of a species of Elm, and many other kinds may be found on Poplars and Hickories. In most other cases the Mother-fly simply deposits an egg or eggs, along with a drop of poison, in the infested part of the plant, and then goes off and dies. In due time the egg hatches out into a larva, and the larva subsequently changes into a fly—destined to run through the same cycle of changes as the Mother-fly from which it took its origin. Thus year after year the breed is propagated. Taught by a mysterious instinct, every kind of gall-producing insect knows the particular kind of plant in which alone its future larvæ can subsist, and selects that kind with as unerring certainty as the best Botanist in the whole world could do.

Besides the Grape-vine gall which you send, and the similar ones received from Mr. Foster, I am acquainted with a very much larger one which is undescribed, and Osten Sacken has described two other kinds, all of the above being made by Gall-gnats. You may ask how I know that your galls are made by Gall-gnats, seeing that I cannot have had time as yet to breed the fly from them. The answer is, that there is a peculiar "breast-bone," as it is called, found in the larvæ of all known Gall-gnats (*Cecidomyia* family), and never in any other kind of larva. Consequently, I had but to open one of your galls, extract the larva, glance at it with a lens, and I knew at once what kind of insect had made the gall.

The caterpillars feeding on the leaves of the same "Texas Mustang" Grape-vine, which you send, belong to two different species of Sawfly (*Tenthredo* family). More than this I cannot tell you, as the species are both unknown to me. The larvæ of the Sawflies, although they belong to the same Order (Hymenoptera) as the Bees, Wasps, Ants, &c., yet have the general appearance of the larvæ of the Moths, which belong to the Order Lepidoptera. They may be distinguished, however, by usually having from 18 to 22 legs, (whereas the larva of no moth has more than 16 legs,) and by the pro-legs or sham legs behind the 6 true legs in front being not furnished with the numerous minute and almost microscopic little hooks generally found in the larvæ of the moths. They differ also in other respects, which it would be tedious to particularize.

Willie C. Fish, Mass.—The flat bark-beetles are *Prometopia 6-maculata*, Say. The larger *Tomicus* is *pini*, Say; *calligraphus*, Germar, (= *exesus*, Say,) is very similar, but one-third longer. The smaller *Tomicus* agrees with the description of *pusillus*, Harris; but as that species is said by Fitch to inhabit the trunks and limbs of sapling pines, and yours inhabits small twigs, your species is not improbably the European *ramulorum*, which closely resembles *pusillus*, and has the same habits as your insect.

Aculeus, Kentucky.—This Journal is not the place for long and purely scientific discussions about Guest-gall-flies. For such I must refer you to my Papers on the Willow Gall insects, published in the *Proceedings*, and to Baron Osten Sacken's Papers on *Cynipidæ* in the same publication. I will only say here, that I have proved that certain species belonging to certain genera are Guest-gallflies, and not true Gall-makers; whence it is reasonable to infer, in the absence of any proof to the contrary, when other species belonging to these genera are bred from galls, along with species belonging to genera known to produce galls, that the latter are Gall-makers, and the former Guestflies. As to the Blackberry Gall, as you send no specimens of the insects bred therefrom, I cannot tell you what they are, whether the gall-making *Diastrophus* or the guest-gallfly *Aulax;* but you can easily find out by referring to Osten Sacken's Paper. If you are correct in saying that the wing of the larger fly "has but one vein," it is not a Gallfly at all, but a *Chalcis* fly and a parasite.

The green *Cicindela*, which you speak of, is probably *sexguttata*, Fabr. I cannot identify a *Coccinella* from a curt description and a pen-and-ink sketch. Send specimens always, if you want the correct name for any insect. It always saves both parties a deal of unnecessary trouble; and one insect named with certainty is better than a dozen guessed at.

Samott Casii, Kentucky.—The milk-white "miller," expanding about an inch and a half, which you send, is the common *Arctia Virginica*. The larva is a hairy caterpillar, swarming in every garden in the Northern States, and feeding upon the leaves of almost everything. I once found a large brood of them on an apple-tree; but more usually they infest herbaceous plants. In color this larva varies most astonishingly, ranging from almost white, through various shades of tawney, to almost black. It is an unmitigated pest, and both larva and moth should be slain without mercy, wherever they are found. The snout-beetle which you send, is the same *Epicærus imbricatus*, to which I recently referred in this Journal, Vol. II, p. 81. You say that "something has caused a number of your one-year old apple scions to crack near the bottom," and that you found a single specimen of the above Snout-beetle in one of the cracks. Possibly he may be the author of the mischief; but from analogy I should rather infer not. As you say that the diseased young trees contain no borers and no signs of borers, and that "the cracked place averages from half to two inches" long, I am at a loss to know what can have caused it, and can therefore indicate no remedy.

Thos. McGraw, Wisc.—The cocoons sent are those of the gigantic moth *Attacus cecropia*. Usually but one or two larvæ are found on a single tree; but a case has been recorded in the *Prairie Farmer*, where this larva swarmed on a particular tree. Respecting the above moth, see answer to Thos. T. Smith, Practical Entomologist II, p. 55.

S. Davis, Ill.—I gave the information you desire in the first number of the current volume of this Journal.

Addison Kelley, Ohio.—The insect infesting your grape-vines is the common Grape-vine Flea-beetle, (*Haltica chalybea*), figured and noticed Practical Entomologist, II, p. 50. See also I, p. 40, for an excellent account of this insect by Mr. Kirkpatrick of your State. I have recently ascertained that it passes the winter in the perfect state, coming out early in the spring to lay its eggs on the young shoots. Hence, by destroying a single one at this early season of the year, you stop the propagation of untold thousands thereafter. You remark that, "if not picked off and destroyed, it often kills the vine by destroying the buds, so that the vine dies down to the root." Hence, as it seems, it would be well worth while to go over your vines in early spring, and kill as many of these blue-coated gentry as you can find on them. The popular belief that it deposits its eggs "in the bark" is, as you rightly suggest, an error. The following account of the depredations of this beetle, is copied from the *Proceedings of the Alton, (Ill.) Horticultural Society*, for May 2, 1867:—

Dr. Hull presented specimens of the *Haltica (graptodera) chalybea*, or steel-blue flea-beetle. He had found them very numerous. Has had them in his grounds for some years, but was not aware of their habits until taught by experience, and had not consequently looked to their destruction as a necessity. The experience of last season was of such a character as to leave no doubt, but that to grow grapes successfully they must be first destroyed. The spring of 1866 they were very numerous, and before he was fully aware of his danger his grape crop was nearly destroyed. This spring, in a small vineyard, one of the first planted, they swarmed by thousands, and he had burnt them out, by surrounding them with fire and letting the fire run in the dry grass through it. It was a rough remedy, but as his crop was destroyed, he let the beetles follow suit.

H. B. Howarth, Wisc.—The small two-winged fly, with 2 dark bands on each wing and the head prolonged on each side into a short pillar, at the tip of which the eye is placed, is the *Sphyracephala brevicornis* of Say, subsequently described by Fitch as *Sph. subbifasciata*. Late in the autumn I have found this insect retiring for the winter, in prodigious numbers, into the cracks in limestone cliffs on Rock River, Illinois. Say found considerable numbers in a similar situation on the Upper Missouri in 1819. By some unaccountable oversight, Dr. Fitch asserts that in Say's species the tip of the wing is dusky, (*N. Y. Rep.*, I, p. 70); whereas in reality Say describes the tip of the wing as glassy transparent, just as it is described in Dr. Fitch's supposed new species. Yet it is solely upon this illusory difference that the so-called new species *subbifasciata* is based! It is by similar confusions and mystifications, and the lust of species-grinding closet-naturalists to immortalize themselves by giving names to their fancied new species, that synonyms are piled mountain-high, one on top of the other, till science becomes a mere mass of verbiage, instead of being what it ought to be—a systematized accumulation of facts.

C. H. R., New York.—The large dark brown beetles, of which you dug up such numbers from an old clover sod, are the common "May-bug," (*Lachnosterna quercina*), the larva of which is known everywhere as the "White grub," being white with a red head, and is very destructive to the roots of various plants, particularly to strawberries and lettuces, and also to young trees in the nursery and to tame-grass meadows. If you had let these beetles alone, they would have come out of the ground in May. You will probably find these larvæ very injurious to the strawberries and pear and apple stocks planted on your clover sod. Both the specimens sent are females.

"Josh," N. Y.—The moth is *Arctia virgo*, Linn. Of the beetles, the large elongate brown one is *Orthosoma cylindricum*. Ditto shorter, *Lachnosterna quercina*. Black, with many-grooved elytra, *Harpalus caliginosus*. Black, with 3-keeled elytra, *Silpha surinamensis*. Black, with red scutel, *Penthe obliquata*. Black, wrinkled, *Osmoderma scabra*. The insect without wings or elytra is the larva of a *Blatta* (cockroach.) The best work for you to begin with is Harris's *Injurious Insects*. Your specimens reached me all broken to pieces, and the numbers you had attached to them loose in the box, the box itself being pressed as flat as a pancake. I cannot for the future undertake to name specimens that reach me in such miserable condition.

Dr. Houghton, Penn.—The Blister-beetles which you send and which, as you say, "appear to feed upon the flowers of the pear-tree and also upon the fruit when it is young and tender," are the very same species (*Lytta ænea*) that was recently sent me from Michigan with a statement that it infested there the flowers of the Pear-tree. (See Answer to J. M. Tracy in the last Number.) Possibly it may be this identical species that also attacks the young fruit; but I rather suspect that it is *Lytta Sayi* which attacks the fruit, and that *L. ænea* confines itself to the flowers. The two species—though perfectly distinct and never running into one another by intermediate varieties—yet resemble each other so very closely, that even that most accurate observer Say supposed the one to be a mere variety of the other. Your specimens reached me in excellent order. When I receive some taken off the fruit, I can solve the above question with certainty.

As to the Barklouse that infests your orchard, I should recommend you to catch and place upon your infested trees as many as you can procure of the Twice-stabbed Ladybird, (*Chilocorus bivulnerus*, figured in this Journal II, p. 42). You can beat them in reasonable numbers off the boughs of forest trees into an inverted umbrella; oaks in particular are full of them. I do not know by actual experiment that this remedy will prove effectual, but I know that this insect preys upon barklice, and I am going to try the operation upon my own trees this year. You see I do not preach one thing and practice another. In any case this remedy can do no possible harm to your orchard—which is more than can be said of some of the Patent advertised washes.

Andrew S. Fuller, N. Y.—The opaque-white boring larva, about one inch long, with a red head and a blackish mouth, which you found "boring the stem of a Blackberry near the surface of the ground," reached me in excellent order, owing to having been carefully packed in damp moss, and I hope to breed the perfect insect from it this summer. It will produce some moth, and probably some species of *Ægeria*—the same genus to which the common Peach-tree Borer appertains. No such larva has hitherto, so far as I know, been recorded as infesting the Blackberry, the common Borer of that plant being a legless grub, and producing a Beetle—the *Oberea perspicillata*, of Haldeman—whereas your larva has sixteen legs, and must necessarily therefore produce some kind of moth. Besides the *Ægeria* which inhabits the Peach-tree, there are distinct species known to infest the Pear-tree, the Ash, the tame Currant, the wild Currant, the Grape-vine, the Squash and Pumpkin vine, the Poplar, the Maple and the Lilac. As a general rule, each species seems to confine itself to a distinct genus of plants, but the Peach-tree borer is occasionally found to attack the closely allied Cherry-tree and Plum-tree. Do not be afraid of "boring" me by sending such specimens as the above. The more you send me, the better pleased I shall be.

PUBLISHER'S NOTICE.

The subscribers to this Journal will no doubt be surprised to receive this month a number of only *eight* pages; and many will join in with the regret of the publishers, that three more numbers will, for the present, close this work. The decrease in the size of the numbers, is caused by the want of sufficient funds, on the part of the Society, to issue more pages, the expense of puplishing the Paper having already considerably exceeded the receipts.

It has become very evident that the time has not yet arrived, when the Agricultural community—to whom economic entomology is of the most importance—will sustain a work devoted exclusively to that subject.

The devastations of injurious insects will, no doubt, continue to increase as long as the farmer, gardener and orchardist remain ignorant of the habits of these insects, and until they learn how to distinguish their friends from their enemies. They will doubtless awake from their apathy when they find that the "Hessian Fly," the "Wheat Midge," and the "Chinch-bug" have destroyed the crops of grain,—the "Potato-bug" the crop of potatoes,—the "Curculio," the "Plum-gouger," the "Codling Moth," the "Bark-louse," and the various kinds of "Borers" the crop of fruit; and then, *perhaps*, they will—when too late—seek for practical knowledge how to destroy their insect-enemies and how to encourage and foster their insect-friends.

ILLINOIS STATE FAIR.

We have received the *Premium List of the Fair of the Illinois State Agricultural Society*, to be held at Quincy, Sept. 30th—Oct. 5th, 1867. As the Iowa State Fair will be held at Lyons the week previous, and the great St. Louis Fair the week subsequent, this arrangement will be very convenient, both in time and locality, for those desiring to attend all three Fairs. The premiums offered are exceedingly liberal and very judiciously apportioned; and as we are informed, "the citizens of Quincy, with great liberality, have guaranteed to the Society every facility for making the Fair a success, *except weather*." What can the Quincy people mean by such a ridiculous oversight? Why did they not subscribe a few extra dollars and bribe the Clerk of the Weather to lock up his watering-pot during Fair Week? Such conduct is as bad as that of the old miser who subscribed a thousand dollars for some charitable purpose, and then deducted one-eighth of one per cent. for prompt payment.

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THE
Practical Entomologist.

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PHILADELPHIA, JULY, 1867.

SCIENTIFIC NOMENCLATURE.

A correspondent, Mrs. S. P. Monks, of New York, asks the following very pertinent questions, and another correspondent, Mr. W. V. Andrews, of New York, has apparently been puzzled in the same manner. I shall therefore reply to both in the same article, and as briefly as possible. The subject, however, is a very extensive and difficult one, and is moreover, with certain naturalists, a very sore one. So that, in expressing my own opinions, I shall probably, no matter how careful I may be, tread upon somebody's entomological corns. Incredible as it may seem to the general reader, there are certain naturalists who cannot bear to have their pet theories called in question, and fly into a passion when any one ventures to differ from them; and like most angry men, instead of meeting argument by argument, answer with nothing but a torrent of misstated facts and violent abuse.

> Why does L. Trouvelot, in the *American Naturalist*, call a moth *Telea Polyphemus*, and Harris in the *Injurious Insects*, call it *Attacus Polyphemus?* The latter says that the genus *Attacus* comprises *Luna, Cecropia, Promethea* and *Polyphemus*, while the former says *Tropæa Luna, Platysamia Cecropia, Callosamia Promethea*, and *Telea Polyphemus*. I thought Harris was excellent authority, and these different names bother me.

These four large and beautiful moths were all arranged under the genus *Attacus*, by Linnæus and Drury in the last century, Drury having been the first to describe *Promethea*, and Linnæus having previously described the other three. Harris, writing for the general reader, and endeavoring evidently to simplify his nomenclature as much as possible, followed the old arrangement; Dr. Morris has also included all these insects under *Attacus* in his *Synopsis;* and I have done the same thing myself in the PRACTICAL ENTOMOLOGIST. But—and of this, Harris was probably well aware—towards the commencement of the present century Linnæus's old genus *Attacus* was cut up by a German entomologist, Hübner, into several new genera; and since then various other new genera have been dismembered from it by authors. In fact, there is scarcely one of the old Linnæan genera in any department of Natural History, that has not been treated in the same manner, the tendency of modern science being decidedly towards subdividing and splitting up. Indeed, if things go on in their present course for many more years, we shall soon have as many genera as species. For although many of the proposed new genera are based upon definite distinctive characters, and ought, therefore, to be accepted, if necessary, yet a considerable percentage of them are founded upon loose, indefinite, shadowy characters, such as, in my opinion, are only of specific value. For example, the genus *Callosamia*, in the group of moths referred to above, has been separated from Hübner's genus *Samia*, by Dr. Packard of Maine, solely "on account of its slighter form, the front wings being more hooked at tip, [chiefly in the male], the hind wings much longer behind, [chiefly in the male], and the front of the head narrower and not so hairy, while in the middle of the wings are partially transparent, triangular spots." [In my specimens there are no such spots.] And upon equally loose and indefinite characters Mr. Grote, of New York, has separated the genus *Platysamia* from Hübner's genus *Samia*, to receive the *Cecropia* moth, restricting *Samia* to the moth of the Arrhindy silk-worm, (*S. cynthia*). Of course there can be no limit to such operations as these but the good sense and moderation of the author. For as long as any two species remain in the same genus, it will always be easy to take characters which separate one of them from the other, call them generic characters, coin some long-winded new generic name, and then—*hey presto!*—we have a new genus.

Mrs. Monks might have added that, in addition to the discrepancy in nomenclature between Harris and Trouvelot, Dr. Fitch has adopted a third set of names, following English, instead of German or American authorities. It will be found that he names the four moths enumerated above, *Actias Luna*, *Attacus Cecropia*, *Attacus Promethea*, and *Hyalophora Polyphemus.* The genus *Hyalophora* (in English "glass-bearer"), it may be incidentally remarked, was constructed, or as Mr. Grote would say, "eliminated," by an English writer (Duncan) to receive certain species with "glassy" spots in their wings; and he had the incredible carelessness to refer the *Cecropia* moth to this new genus of his, erroneously supposing that it had such glassy spots. If, on the other hand, we reject Packard's and Grote's new genera, and rely exclusively on Hübner, we shall get a fourth set of names, *Tropæa Luna*, *Samia Cecropia*, *Samia Promethea* and *Telea Polyphemus.* And so on, almost *ad infinitum.*

It will be observed, however, that throughout all these changes in the names of the genera, the specific names remain unchanged. The reason of this is, partly because it is contrary to scientific etiquette to change any specific name, after it has once been published and ratified by a good and sufficient description, and partly because species have a real existence in nature, while genera, as I believe, are the mere creatures of the human brain, and to a great extent are dependent upon the whim and caprice of the genus-grinder. For example, the very same author will often, at different times and in different publications, refer the very same insect to three or four different genera. Even the very best entomologists have occasionally done this; and with the smaller fry it is almost the rule, rather than the exception. Now if, as Agassiz maintains, genera have as real an existence in nature as species, how does it come about, for instance, that, while all authors have always been agreed that the *Promethea* moth is a distinct species from the *Cecropia* moth, and all of them give these two moths the same specific names, there is such a wide difference of opinion as to whether or not they belong to one and the same genus—Drury, Hübner, Duncan, Westwood, Walker, Fitch and Harris holding that they do, and Prof. Agassiz, Dr. Packard and Mr. Grote holding that they do not? This argument might be multiplied indefinitely; but one such case is enough for my purpose.

If my opinion is asked as to the four insects referred to above, I believe that they belong to three distinct groups, *Luna* to one, *Cecropia* and *Promethea* to another, and *Polyphemus* to a third. But nobody has yet been able to define the difference between a genus and a subgenus, and whether these groups are genera, or subgenera, or mere generic sections, and whether, if they are subgenera, subgenera ought to receive a distinctive name, and whether in that event we ought to write *Attacus* (*samia*) *cecropia* or *Samia cecropia*, are doubtful and disputed questions, about which I do not much trouble my head. Upon such questions authors always have differed, and always will differ to the end of time. And, after all, they are questions of words, rather than questions of things; and science ought to deal as much as possible in things, and as little as possible in words. Unfortunately for the cause of peace and quiet, the scientific world is, not a monarchy, but a democracy; and there is no tribunal to which we can, in the last resort, appeal, to resolve such knotty and insoluble problems as the above, or to fine and imprison refractory and impenitent members of the worshipful fraternity of Genus-grinders.

One cause, perhaps, of the undue tendency in these modern times towards the multiplication of new genera, is a practice which has been introduced, of quoting as authority for the name of a species, not the name of the author who first described that species, but the name of the author who has for the first time referred it to the latest and most fashionable new genus for the current year. Thus the same insect, which in 1767 is *Attacus Cecropia* Linnæus, becomes in 1816 *Samia Cecropia* Hübner, in 1852 *Hyalophora Cecropia* Duncan, and in 1865 *Platysamia Cecropia* Grote. According to this rule, Linnæus is robbed of the honor of attaching his name to the species which, as all allow, he was the first to name and describe; and a positive premium is held out to writers to do what most modern naturalists, with the honorable exception of Lacordaire and a few others, are already too apt to do, namely, to multiply unnecessarily the number of new genera.

As long ago as 1807, the great French Entomologist, Latreille, expressed himself as follows:—"New genera should not be founded upon trifling differences, but only when the differences are considerable, and when necessity demands the subdivision of an old genus, for example, when the number of species included under that genus is inconveniently large." (*Gen. Crustac. Insect* III, p. 61.) It is greatly to be desired that some of our younger North American naturalists would pay a little more attention to these eminently useful and practical suggestions. B. D. W.

CURRANT PLANT-LICE.

(*Aphis ribis.*)

[From the Proceedings of the Alton, Ill., Horticultural Society, May 2, 1867.]

Mr. J. Huggins, chairman of the committee on Entomology, presented leaves of "Currant," evidently diseased—cause to him unknown. The leaves were marked by reddish-brown blotches of irregular form, the surface whenever attacked was raised up and thickened.

Remarks by B. D. W.—From the description, this is probably nothing but the work of the Currant Plant-louse, (*Aphis ribis*). I have referred to it more fully in my article on Plant-lice, in the Practical Entomologist, II, pp. 37—8. If it is not this, I do not see what else it can possibly be; unless the Alton Currant-bushes are afflicted in some manner unknown in Northern Illinois.

ANSWERS TO CORRESPONDENTS.

Sam. Haycraft, Corr. Secr. Kentucky Pomol. and Hort. Soc.—The chestnut-brown beetle, two inches long, and with pronged jaws, like a buck's horn, almost as long as its body, is the male of *Lucanus elaphus.* It is commonly known in your State, unless I have been misinformed, as the Buck-bug—a pretty fair translation of the scientific name of the species which is the Greek word for Deer (*elaphus*). The female has jaws only of the ordinary size, and is very rare in collections—indeed I know of no collection but my own that possesses a specimen of that sex. I took mine in South Illinois, six years ago. In North Illinois the species is not met with, though we have two other species of the same genus which are common enough, one of which is also common in South Illinois, and probably with you also. It belongs to the *Lucanus* family of beetles—all the members of which feed in the larva state on decaying wood, and none of them on living vegetable substances. Instead of being injurious, they are consequently beneficial, by clearing away decaying matter that would otherwise generate fevers and agues.

The males throughout the *Lucanus* family have much longer jaws than the females, but in no North American species are they so enormously lengthened as in your insect. Both males and females of this family are popularly known in the North as "Horn-bugs;" though the appendages in question are confined to the male sex, and in reality are not horns, but true jaws. I recently, in the Practical Entomologist, (p. 88), referred to this case as one of those, where an organ is perverted from its normal functions in order to enable the male to grasp more readily the body of the female. We find another such case in a gigantic Fly with four gray wings, common near large rivers, (*Corydalis cornutus*), where the jaws of the male are lengthened into the shape of the finger of a grain-cradle, evidently to enable him to embrace the soft body of the female; for, as jaws to bite or gnaw with, they are absolutely useless. In this instance, although the jaws both of the perfect female fly and of the larva are armed with strong horny teeth, yet the jaws of the perfect male fly are quite smooth. The reason is evident. If they were armed with sharp prongs and teeth, they would penetrate the soft body of the female fly, and thus defeat the purpose for which nature constructed them. The Horn-bugs, on the contrary, are, as is well known, enveloped in a strong coat of mail, and here we find the prehensile jaws of the male armed with sharp prongs and teeth, and curved in such a manner as to give the best possible grip on the slippery, shelly body of the female. Thus does Nature, ever prompt and ever thoughtful, modify her plans to suit the particular circumstances of every case; and even in the beetle that we every day crush ruthlessly under our feet, we may find the clearest proofs, that the world, as it now exists, could never have been generated by the fortuitous concurrence of atoms, as was formerly believed by the old Epicurean school of philosophers, and is still believed by a few scattering individuals in these modern times.

Thos Siveter, Iowa.—I have no specimens of *Trichina spiralis.* The cocoon must be that of some species of *Attacus*, perhaps of *Attacus luna*, the great grass-green moth with long tails to its hind wings. But it is a great deal larger than any that I ever saw.

Thos. Gregg, Illinois.—The gray snout-beetle, that you find on apple and plum trees, is the New York Weevil (*Ithycerus noveboracensis*), so called because it was originally described by Forster from a specimen found in New York. It is, however, comparatively quite rare in the Eastern States, but in the West it is common, and sometimes swarms in nurseries and ruins hosts of young trees. Its mode of working is to devour the buds and young shoots. It should be slain without mercy, wherever it is found.

J. J. Jackson, Delaware.—The large beetle you send is the same *Necrophorus americanus*, which I have mentioned in the Answer to A. D. Strong, in this number of the Practical Entomologist. For the habits of these "Burying-beetles" I must refer you to that Answer. Their larvæ are active six-legged grubs.

Henry Morey, Illinois.—There are two broods of Codling Moths every year, at all events, there are two in these latitudes, though possibly in New England there may be but one. The first comes out in June, about the time that the apples are as big as hazel nuts, from pupæ that have passed the winter in that state. After pairing, the females of this brood lay their eggs in the blossom end of the young apples, the larvæ hatching out from which, burrow into the core and live there till they are full-fed. The moths from this brood of larvæ make their appearance about the end of July or the beginning of August, and deposit a second crop of eggs in the apples of the same year's growth, the larvæ from which leave the apples probably towards the end of September. There are, however, a few late individuals of the first brood of larvæ and early ones of the second, so that practically one must search for their cocoons all the time, from July 15 to September 30. I have myself bred numbers of the moths about the end of July from apples of the same year's growth, thus proving that it scarcely takes two months for the insect to pass through all its stages from egg to moth. The larvæ of both broods bore their way out of the apple when full-fed, and usually spin up under loose bark, under hay-bands or cloths wrapped by way of trap round the trunk of the tree, &c. The "little apples that fall off about the 1st of July" are very probably infested by this insect; or they may be attacked by the "Four-humped Curculio" of which I recently spoke.

Thos. Wiggins, Ohio.—The beetle reached me in good order and alive. It is a male of a species (*Clytus pictus*) which produces one of the borers of the Hickory. What is very remarkable, and what I was the first to point out, the female of this species is absolutely undistinguishable from the female of the species (*Clytus robiniæ*) which produces the destructive borer of the Locust, though the males are very different, and both sexes of each come out in the perfect beetle state at very different times of the year, namely, the Hickory-boring Beetle in May and June and the Locust-boring Beetle in August and September. Indeed, until I published on the subject, all authors had confounded together these two very distinct species. For further information on this matter I must refer you to my Paper on Borers, in Vol. I of the Practical Entomologist, where on p. 29 you will find a figure of the male of your species.

The second insect that you send, is the larva of *Corydalis cornutus*—a gigantic four-winged fly with gray wings, which flies by night near large rivers. Its larva lives in the water, but crawls out and hides under stones, logs, planks, &c., to pass into the pupa state. It makes excellent fish-bait. For further particulars I must refer you to the Answer to Jos. S. Lewis, in the Practical Entomologist Vol. I, p. 113.

G. W. Smith, Mich.—As my promised Article on "Wasps and their Habits" will be crowded out of the Practical Entomologist, I will now state briefly that the Blue Wasp which you saw bury a large spider in a sandy place, placed it there as food for its young larva, having first stung the spider so as to paralyze but not to kill it. This is the general habit of all the Digger Wasps—to which group the Blue Wasp (*Sphex cærulea*) appertains. But they do not all employ Spiders for this purpose, many selecting various kinds of insects, as Snout-beetles, Grasshoppers, Caterpillars, Plant-lice, &c. Neither do they all burrow underground to form nests for their future larvæ, some boring into decayed wood, and some making clay-cells in the open air, as for example the well-known Black and Yellow Wasp (*Pelopœus lunatus*) that constructs the so-called "mud-dabs."

S. P. Monks, N. Y.—The minute parasitic flies, of which you found such numbers inside a chrysalis, belong to the *Pteromalus* group of the great *Chalcis* family. These *chalcis* flies very commonly transform inside the pupa upon which they prey. From one pupa of a moth I once obtained 99 such flies. On the contrary, the true Ichneumons emerge to the light of day to pass into the pupa state, and so do most of the spurious Ichneumons (*Braconidæ*), though the *Aphidius* group of these last transform inside the body of the Plant-louse that they have preyed on. One reason, perhaps, for the above difference in habits is, that the *Chalcis* flies spin no cocoons at all, and all the true Ichneumons and most of the spurious Ichneumons spin silken cocoons.

You object, on grammatical grounds I suppose, to the use of such plural forms as "Chrysalises" and "Funguses," and advocate, as I infer, the use of the Latin plurals "Chrysalides" and "Fuugi." I think that when "Chrysalis" and "Fungus" are used as English words, they ought to have an English, and not a Latin plural. And upon the same principle, if custom did not forbid, I would prefer to write "genuses," rather than "genera," as the plural of "genus." You yourself would surely not say that "Washington and Franklin were great genii" instead of "geniuses?" But our language is such a mass of contradictions and anomalies, that neither here nor elsewhere can we lay down any infallible and incontrovertible rule. Other matters elsewhere.

W. V. Andrews, N. Y.—When I said, that with the Bees and Wasps it was only the females that had stings, I included the Workers or so-called "Neuters" of the Social species in the term "females." They are in reality a "dimorphous" form of the female sex—the two forms not running into one another by intermediate grades, and yet in the case of the Honey-bee the very same egg being capable of producing either a Queen or a Worker, according to the mode in which the larva is fed and lodged. Worker honey-bees do even occasionally lay eggs, without intercourse with the drones or males, and these eggs develop into drones. In the case of the Social Wasps, as stated in the Answer to Miss Hobart, (Practical Entomologist II, p. 33,) the Workers are even capable of generating other Workers, also without any intercourse with the male or drone Wasps. The Queen of the Honey-bee has a sting, just as well as the Worker Honey-bee; and the same is true of the large Females, or Females *par excellence*, of all the Social species of Bees and Wasps found in the United States. There are indeed certain genera of Social Bees (*Melipona*, &c.,) where neither the Females nor the Workers have stings; but these are chiefly natives of South America and Australia, though a few species occur in Mexico and Cuba. In the case of all the Bees and Wasps that are not Social, there is only one kind of female, or, in popular language, there are no "workers" as distinct from the ordinary females, and the females perform all the labor of constructing nests for their larvæ, the males being idle gentlemen, solely occupied in sipping honey and gallanting the ladies, as is also the case with the males of the Social Bees and of the Social Wasps.

Volney Abbey, Kansas.—The cutworms reached me, alive and in first-rate order, in the tight little tin box in which you had enclosed them along with some moist earth. They are, as you rightly suppose, true cutworms, and will, in the course of the summer, produce moths or so-called "millers." I cannot identify either species of the two which you send, with any that has been hitherto described. Likely enough, in Kansas you have distinct species of this genus of moths (*Agrotis*), as you have of many other genera of insects.

I can recommend no plan to destroy the foe that is now actually attacking you, but the old-fashioned one of digging them out with your fingers, wherever you find your vegetables "cut" by them. This seems at first sight "slow business," but it is not in reality so slow, as any one would suppose who has not tried it. Killing the moths when they appear in the course of the summer, will diminish the crop of cutworms for next year, but will not help you in any way this year. And after all, unless a whole neighborhood were to unite in this plan, it would be comparatively ineffectual, as the moths fly to great distances in the night to deposit their eggs. I have already recommended the use of poison to destroy these moths, and incline to believe that this method would be far more deadly to them than lighting fires at night as you suggest. But, like all other modes of fighting noxious insects, it requires to be practically tested, before it can be recommended as a sure remedy. You will find full directions for poisoning these moths in the Practical Entomologist Vol. II, pp. 52—3.

Wm. Smith, Iowa.—"The brown bug, looking like the sow-bug that is often found on small fruit," which you have noticed to prey on the larva of the Colorado Potato Bug, is probably a species of the *Scutellera* family in the Order of the True Bugs (Heteroptera). These insects have all of them the peculiar smell of the Bed Bug, which they often impart to Blackberries and Raspberries that they have been walking over, and have been heretofore noticed to plunge their long beaks into the Potato Bug larvæ, and suck them dry in the manner that you describe. What are properly called "Sow-bugs" are the gray, 14-legged creatures found under boards in cellars, &c., and are not Insects at all, but belong to the same Class (Crustacea) as the Crabs, Lobsters and fresh-water Craw-fish. As to the Catydid attacking these Potato Bug larvæ, it is entirely a new fact, and I should be glad of a specimen taken in the act. so as to determine the species. I have myself observed Catydids to prey upon flies, so that your statement is by no means improbable. Specimens of grapes, supposed to be punctured by some insect, will be very acceptable.

J. R. Tewksbury, Ill.—The black bug about ¾ inch long, which you found on the root of a peach-tree, is the pupa of *Pirates picipes*—an insect belonging to the *Reduvius* family, (all of which are cannibals,) in the Order Heteroptera (True Bugs.) The perfect insect scarcely differs from the pupa, except in having complete wings reaching to the tip of its abdomen. I always find it underground, and it no doubt preys there upon some of the subterraneous larvæ, that do so much mischief, and are so difficult for us two-legged bugs to get at. The wasp-like moth, about ¾ inch long, belongs to the same genus—*Ægeria*—as the common Peach Borer (*Ægeria exitiosa*), though it evidently differs from that species. What particular species it really belongs to, cannot be told, as the specimen was rubbed almost completely bare, probably in catching it, and broke up into about fifty pieces, by shaking about loose on the road in the tin box in which you enclosed it. But all the known species of *Ægeria* are borers in the larva state, and should, therefore, have no mercy shown them. Of course, though they some of them look like wasps, they have no stings.

A. D. Strong, Ohio.—The shining black beetle, about an inch long, with two irregular orange-colored bands across its wing-cases, is the *Necrophorus marginatus* of Fabricius, and belongs to the *Silpha* family. There are several other species belonging to this genus found in the United States, one of which—the *americanus* of Olivier—is nearly twice as large as your species, and is one of the handsomest insects that we have. All of them have the same remarkable habit of burying small pieces of carrion—such as a dead rat or a dead bird—and laying their eggs therein, the larvæ proceeding from which are thus enabled to monopolize the savory food for themselves. You can easily obtain specimens of our four commonest species, by depositing small pieces of carrion on soft earth anywhere, and visiting them from time to time, having previously marked the exact spot. Do not be surprised, if you find the bird or the rat apparently abstracted 12 hours after you placed it there; but dig down in the exact spot where you had left it, and you will find it, and the insect sexton or sextons most probably still working away to undermine and bury it deeper yet. Hence, in English this group is termed the "Burying-beetles," or sometimes the "Sexton-beetles." In common with many dung-beetles (*Geotrupes*, *Hister*, &c.), the Burying-beetles, as you remark, are often infested by numerous lice, which are not, however, true six-legged lice, such as infest the human species, but eight-legged Mites, belonging to the same Class as the eight-legged Spiders; whereas the true Lice belong to the Class of insects, all of which *in the perfect state* have six legs, neither more nor less. Perhaps, however, the most available criterion to distinguish a Mite from a Louse is the circumstance of its having no head distinct from its thorax. For very many of the Mites use their front legs as antennæ, so that to the inexperienced eye they seem to have only six legs; and some few genera have really only six legs.

M. S. Hill, Ohio.—Your insects are named as follows: —1. *Desmocerus palliatus* Forst. 2. *Gnorimus maculatus* Knoch. 3. *Tetraopes tornator* Fabr. 4. *Dichelonycha subvittata* Lec. 5. *Chrysomela similis* Rogers. 6. *Chr. cyanea* Melsh. 7. *Telephorus carolina* Linn. 8. *Tel. bilineatus* Say. 9. (The true bug) *Pentatoma carnifex* Fabr. They are all pretty common, except Nos. 2 and 6, of which I should be glad to receive a few additional specimens, if you have them to spare. Your observation that the larvæ of No. 6 feeds on rhubarb and dock leaves is, I believe, new to science.

E. Daggy, Ill.—The very minute and almost microscopic colorless insects, which you "discovered in immense numbers—millions upon millions of them—in your hot-beds, clustering upon the ground, but so far as you can discover, feeding upon nothing so as to injure it," must be the very young larvæ of a species of Ground Flea belonging to the genus *Sminthurus*, and are probably the Garden Flea of Fitch (*Sminthurus hortensis*), which you will find figured in the perfect state in the *New York Reports* III, p. 188. These Ground Fleas are quite distinct from the true Fleas, and belong to the same *Podura* family as those lead-colored, wingless, jumping insects, commonly found in small numbers under old logs, and appertaining to the genus *Podura*. The most correct English name for these Ground Fleas is "Springtails," as both genera have a process at their tails, which, when bent under their bodies and suddenly released, enables them to jump like a flea. In *Sminthurus* this process is two-forked, and is very distinctly seen in the specimens sent, though, as is usually but not invariably the case with insects—for example, it is just the reverse with the Dragon-flies—the larva is much more elongate than the perfect insect. The location of these "Springtails," in a Natural system, has perplexed systematists much. As they have a distinct head with two antennæ and six legs, although they never obtain wings, the least objectionable course, perhaps, is to unite them with the Dragon-flies, May-flies, Shad-flies, &c. (Sub-order Pseudoneuroptera). The genus *Podura* is derived from two Greek words signifying "foot-tail," and the genus *Sminthurus* from two Greek words signifying "Rat-tail." The latter term has hitherto been often incorrectly printed "Smynthurus," and it has been still further perverted by Dr. Fitch, by printing it eight times over in the passage already referred to, as "Symnthurus."

I do not believe that any of these insects are injurious to living vegetation, though Dr. Fitch thinks that "when a Flea-beetle [*Haltica*] perforates a hole in a leaf, these Garden Fleas afterwards gather around the perforation to feed upon the soft matter which is there formed by the evaporation of the exuding juice." In the perfect state the Garden Flea is said to be scarcely half the size of a mustard seed, and of a dull black color, so that they resemble grains of gunpowder. In all probability they found congenial food in the decaying vegetable matter of your hotbeds, and will do your young plants no material injury. If, however, you wish to get rid of them, dusting the plants with ashes, sulphur, &c., is *said* to be an efficacious remedy; but I should not like to vouch for it myself.

Aculeus, Kentucky.—As you have now sent on specimens of those flies which you bred from the Blackberry gall, (which, by the way, reached me in good order), I can tell you what they are. Those of which you sent seven specimens, (1 ♂ 6 ♀), are the true makers of the gall —the *Diastrophus nebulosus* of Osten Sacken, rather small specimens, however. In this gall-making genus, as you will observe, the abdomen is evidently composed of several segments. Those of which you sent two specimens, both females, are the *Aulax sylvestris* of Osten Sacken, and are Guest-gallflies. In the *female* of this genus, the abdomen is apparently composed of but a single segment—as is also the case in *both sexes* of certain other genera of Guest-gallflies, but never in either sex of any known genus of true Gallflies—but what is very remarkable, and specially characteristic of the genus *Aulax*, the abdomen of the *male* is apparently composed of two segments. The third insect, of which you send only pupæ, and the winged fly of which has, as you correctly remark, but a single vein in the front wings, does not belong to the Gall-flies (*Cynips* family) at all, but to the *Chalcis* family, and is neither a Gall-maker nor a Guest-fly, but a parasite, feeding in the larva state upon the bodies of the larvæ of the Gallflies, and not, as the latter do, upon the substance of the gall itself. It probably belongs to the group *Eurytoma* of the *Chalcis* family, of which both Osten Sacken and myself have bred a representative from this same gall; and from your description all your specimens are females. In this particular case, there is no direct evidence that the *Diastrophus* is the Gall-maker and the *Aulax* the Guest-fly, and not the reverse, inasmuch as both insects inhabit cells placed promiscuously side by side, in one and the same gall. But as Osten Sacken bred this same *Aulax* from a very distinct Blackberry gall, producing a very distinct *Diastrophus*, this is pretty strong, indirect evidence. Suppose, for example, that this *Aulax* is the real maker of your Blackberry gall. Then one of two things necessarily follows, either, 1st, that the same insect produces two entirely distinct galls on the same genus of plants, or, 2d, that the same insect is a Gall-maker in the case of one Blackberry gall and a Guest-fly in the case of the other gall. This latter supposition is as contrary to all entomological analogy, as it would be to all ornithological analogy, to suppose that our American Cowbird or the European Cuckoo sometimes builds a nest for itself and sometimes lays its eggs in the nests of other birds. The former supposition, from a large experience with gallmaking insects, I believe to be utterly untenable. Therefore, the *Aulax* cannot, allowing the above data to be correct, make your Blackberry gall; which was the thing to be proved.

James Barratt, Mass.—The blue, long-horned beetles, over ½ inch long, which you split out of Yellow Pine (Pinus mitis), arrived in excellent order, and are the *Callidium antennatum* of Newman. You will find a good colored figure of the species in Harris's *Injurious Insects*, (Plate II, fig. 11). Harris mentions its being very injurious to the Pine in New England, but supposing it to be identical with a similar species found in Europe, has named it as *C. violaceum*. Possibly it may turn out in the end that Harris was right. The two you sent were, as you rightly supposed, male and female, the male differing from the female not only in having much longer antennæ, but in having a remarkable shield-like plate sculptured on his thorax, which is not seen in the other sex. There is another very similar species—the *Callidium ianthinum* of LeConte—which infests the Red Cedar, and which Dr. Fitch believed to be a mere variety of your species. But in the Red Cedar insect the male never has the shield-like plate on the thorax always met with in the Pine insect, besides four other differences which I have pointed out. (See *Proceedings* V, p. 206—7, and Fitch *N. Y. Rep.* II, § 237.)

Chas. H. Peck, N. Y.—The Plant-louse found on Pinus strobus is doubtless the *Lachnus strobi* of Fitch, though you send no winged individuals, which according to Fitch are scarce. In this genus I believe that the females do not acquire wings at all; at all events it is so in *Lachnus caryæ*. I should be glad of some winged specimens, if you can meet with such and have them to spare. The eggs on the pine leaves are identical with those received from Mr. Orton of Ohio, (see PRACTICAL ENTOMOLOGIST II, p. 84,) and are laid, I have little doubt, by the *Lachnus*. As to the little black Bark-louse found on Sumac (Rhus glabra), it is the most extraordinary insect I have seen for a long time, having two enormous lateral plates to its thorax, the front one sweeping forwards so as to enclose the large head upon each side, and give the whole insect somewhat the appearance of a Tortoise-beetle (*Cassida*). I can find no genus to which it can be referred with any propriety; and so far as I am aware, the species is new to science. In fact, the Bark-lice have never been much worked at by any one in this country, anomalous and otherwise interesting as the family is. You will do well to try and obtain the winged males of this species, though probably they will be found, as usual in this family, to be very scarce.

John Townley, Wisc.—The cut-worms sent all belong to the same species, except a single darker-colored one, which is probably the one which you noticed yourself as being darker-colored than the others, and which you found feeding on peas. As some of the above were taken by you feeding on the buds of trees, grape-vines and rose-bushes, and some were taken cutting peas and lettuces, it seems to follow that, in this particular case, the same species varies greatly in its habits. I should add, however, that three or four specimens were killed on the road by their friends by way of provision, and that those you had insulated in the paper box, bored their way out and got mixed up with the rest. Neither of the two species, which reached me alive, agrees with any of Mr. Riley's three described species. Besides the plants above mentioned, you say that you have found cut-worms "eating the buds of lilacs, of the Tartarian honeysuckle and of the common Snow-ball shrubs;" and that round the last two you "had tied branches of the Norway Spruce, which did not stop them. Bright tin, however, they cannot climb up." This agrees exactly with what Mr. Riley has said on the subject.

Thos. L. J. Baldwin, Del.—The specimens of Potato Scab were received in excellent order. I hope for more during the summer.

Robt. L. Walker, Penna.—The small light-green insects on your Currant leaves are the common Currant Plant-louse (*Aphis ribis*), which I briefly referred to in my recent Paper on Plant-lice. The best way to get rid of them, is to catch a number of the Lady-birds that prey on them, and scatter them among your bushes. With a common Entomological Sweeping-net—i. e. a bag of strong cloth fastened to a hoop of strong iron wire, and the hoop attached to a short staff—you may, by brushing the herbage backwards and forwards, catch any number of these Lady-birds. They are readily distinguishable from all other common insects by having only three joints to their tarsi or feet.

Miss Isaure A. Plucke, N. Y.—The elongate, red, long-horned beetle, fully half inch long, that you found on milkweeds, (Asclepias), are the *Tetraopes tornator* of Fabricius, and belong to the *Cerambyx* family. I find them every year abundant on the same plant, and mixed up with them in small numbers, a species very closely resembling them, but differing, among other characters, by the antennæ being beautifully banded with black and white, instead of being plain black. This last is the *Tetraopes femoratus* of LeConte. The short-oval beetles over quarter inch long, with cream-colored wing-cases, dotted and streaked with black, are not Ladybirds, as you suppose, but leaf-feeding beetles, belonging to the great *Chrysomela* family. They are the *Chrysomela bigsbyana* of Kirby; and I have ascertained that the larva, which is a miniature edition of that of the Colorado Potato Bug, feeds on Willows. There is a very closely allied species—the *Chrysomela philadelphica*, of Linnæus—which scarcely differs, except in the thorax being dark bottle-green, instead of rust-red behind and cream-colored in front. What this last feeds on in the larva state, I do not know, and should be glad to hear. It is very rare with me, though common elsewhere; the other one is tolerably common here. You may always distinguish Ladybirds (*Coccinella* family), from any other beetles that you will be likely to meet with, by their feet (tarsi) having only *three* joints; whereas all the *Chrysomela* family, some of which are spotted much like Ladybirds, have *four* joints to their feet. This criterion is of great practical importance, because with a single exception (*Epilachna borealis*, figured PRACTICAL ENTOMOMOGIST II, p. 42), all the Ladybirds are our friends, preying upon other insects, and all the *Chrysomelas* are our enemies, feeding upon the foliage of various plants.

As to what you take for living "animals, found in eggs," I think you must be mistaken. What you send appears to me to be merely a part of the egg itself, probably developed by a short incubation. Certainly it is not any insect, and is therefore out of my jurisdiction. I know of no such living animals ever having been found in bird's eggs by any one. As to living parasites in the eggs of insects, that is a different affair altogether.

☞ Answers to J. J. Kelly, V. T. Chambers, William Kite, E. T. Snelling, Jno. Edgerton, Saml. D. Martin and G. W. S., Conn., will be given in the next number.

FERTILIZING PLANTS.

Few entomologists are aware, what an important part is played by insects in fertilizing certain kinds of plants. The old idea among Botanists was, that hermaphrodite flowers shed their own pollen upon their own stigmas, thus, as stock-raisers term it, "breeding in-and-in." But it has recently been shown, that there is an almost infinite variety of contrivances in Nature to prevent this, and that in many such cases bees and other insects, flying from flower to flower, convey the fertilizing pollen from one flower to another, and that without their agency either no seed at all, or seed inferior, both in quantity and quality, is perfected. It is remarkable that almost all flowers which are fertilized by the aid of insects are gaily colored, so as to attract insects; and Mr. Darwin observes that he does not know of a single flower, fertilized exclusively by pollen blown upon it by the wind, that is not of a dull unattractive appearance. B. D. W.

THE PEACH WORM.

Dried peaches, as is well known, are often so much infested by a small worm as to become worthless. But it has not yet been recorded, that this worm is the larva of a small moth or "miller," belonging to the same family (*Tinea* family) as the well-known moths which destroy woollen clothes, furs, carpets, &c. Having myself bred very numerous specimens to the perfect state, I am enabled to identify it as the same insect, (*Ephestia zeæ*,) which was long ago described by Dr. Fitch as infesting "stale Indian meal and emptying cakes made thereof," (*N. Y. Rep.* I, p. 320, and Plate IV, fig. 1,) and which Dr. Clemens states to feed on "rye, corn, clover-seed, garlic-heads and preserves, especially those contained in jars." (*Proc. Ac. Nat. Sc. Phil.* 1860, p. 206.) While in the larva state, it is preyed upon to a very considerable extent by a small Ichneumon-fly, and also by a small Scorpion-like Spider with claws like those of a crab—the *Chelifer oblongus* of Say. B. D. W.

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PHILADELPHIA, AUG. AND SEPT., 1867.

VALEDICTORY.

In taking my final leave of the readers of the PRACTICAL ENTOMOLOGIST, I feel that I ought not to omit returning my best thanks to the numerous gentlemen who have rendered me their valuable assistance during the current year. It is perhaps invidious to specify a few names, where so many have coöperated, but I cannot avoid mentioning in particular Dr. J. L. LeConte, Mr. E. T. Cresson, Mr. S. S. Rathvon, and Dr. J. S. Houghton, of Pennsylvania; Mr. H. Ulke, of D. C.; Baron Osten Sacken, Dr. Wm. M. Smith, Mr. Peter Ferris, Mr. Isaac Hicks, and Mr. J. H. Parsons, of New York; Mr. W. C. Fish, of Mass.; Mr. M. S. Hill, of Ohio; Mr. John Townley, of Wisconsin; Dr. E. S. Hull, Dr. H. Shimer, Mr. Elmer Baldwin, Mr. M. S. Dunlap, Mr. F. K. Phoenix, and Miss Marion Hobart, of Illinois; and Mr. J. Pettit, of C. W. Would that I could with propriety add Dr. B. Clemens, of Penna., to the list! But alas! he is gone from among us, and we shall not soon see his like again. B. D. W.

THE STATE ENTOMOLOGIST OF ILLINOIS.

The *Canada Farmer,* in its issue of July 15, 1867, congratulates the State of Illinois upon their discernment and public spirit in creating and liberally endowing the Office of State Entomologist, and is "much pleased to learn that the appointment has been conferred upon the talented Editor of the PRACTICAL ENTOMOLOGIST." As I find that a similar delusion is very prevalent throughout the United States, and as I do not wish that the State, in which I am for the present residing, should be complimented for doing what in reality it has not done at all, I think it proper to give here the true facts of the case.

On the last day of the regular biennial Session, in the winter of 1866—7, our Legislature, as the *Canada Farmer* correctly states, "passed a Bill authorizing the appointment of a State Entomologist, with a salary of $2000 per annum," *but only for a period of two years.* By the terms of this law, the appointment was vested in the Governor, "by and with the advice and consent of the Senate." On the earliest possible opportunity, namely, at the Special Session held in June, 1867, the Governor accordingly sent in my name to the Senate for the office. But instead of either confirming or rejecting the Governor's nomination, the Senate postponed all action upon it till the next regular biennial session in the winter of 1868—9, when, by the terms of the Law itself, the Office of State Entomologist will already have ceased to exist. In other words, they in effect vetoed a law which they, in common with the House, had in the first instance voted for; or, which is the same thing, took such action that the law became, for all practical purposes, mere waste paper.

It strikes me that this is a good deal like the platform of the facetious politician, who professed himself to be theoretically in favor of the Maine Liquor Law, but strongly opposed to its practical enforcement. B. D. W.

THE THREE SO-CALLED ARMY-WORMS.

There are three perfectly distinct caterpillars, or "worms" as they are popularly called—producing three perfectly distinct moths—which at various times and at various places in the United States have been designated as "Army-worms." The habits of the three insects being quite distinct, this, as we might naturally anticipate, has given rise to endless misconception and confusion. It is much as if hogs, dogs and cows were all in a certain locality to be called "cows," and the habits of the three kinds of animals were, in consequence of the misnomer, to be jumbled up promiscuously together. Mistaking one for another, farmers would then attempt to make butter and cheese out of sow's milk—they would take dogs' flesh to market and attempt to sell it for beef—and the true veritable cows they would perhaps expect to keep watch over their houses by night.

The first of these three caterpillars is the destructive Cotton caterpillar or "Army-worm" of the South, which feeds, so far as is known, exclusively upon the leaves of the Cotton plant, generates two or three distinct broods every year, and makes its cocoon above ground by drawing together the leaves of the plant upon which it feeds. This larva changes the same season to a reddish-gray moth (*Anomis xylina*) belonging to the great group of the Owlet Moths (*Noctua* family.) It must be carefully distinguished from another species belonging to the same family, the Boll-worm Moth of the South (*Heliothis armigera*), which burrows indiscriminately either in the Boll of the Cotton plant or in the ears of Indian Corn, and is found in the more southerly of the Northern States as well as in the South, On the other hand, the Cotton caterpillar has never been met with, except where cotton is grown—i. e. in the more southerly of the Southern States.

The second species, which is that which is correctly termed Army-worm, feeds upon the grasses, the cereal plants, and a few other herbaceous plants, but never under any circumstances has been known to attack trees or shrubs of any kind, and occurs from the extreme southern point of Illinois, in the latitude of Petersburg, Va., to the northern parts of Maine. Of this insect (*Leucania unipuncta*) there is but one brood produced in one year, the larva going underground to pass into the pupa state, and the moth usually appearing a few weeks afterwards, though a few lie under ground all through the winter, and do not transform into the moth state until the following spring. The larvæ have the remarkable habit of migrating, in vast armies or crowds, from one field to another; and in such cases they are often successfully fenced out by digging long ditches across their path, up the perpendicular sides of which they are unable to climb. From this habit of theirs evidently arose the very appropriate and significant name of "Army-worm." Like the preceding, this species belongs to the great group of the Owlet-moths; and it further resembles that insect in appearing, in vast numbers, only in particular years and particular seasons, though a few may be met with every year by the careful collector.

A third species which has been locally known as the "Army-worm" for many years back, in the north-west corner of the State of New York, I have recently ascertained to be the Tent-caterpillar of the Forest (*Clisiocampa sylvatica*, figured Harris *Inj. Ins.*, Plate 8, fig. 19)—a species which, both in the larva and in the perfect moth state, very closely resembles the common Tent-caterpillar of the Apple-tree (*Clisiocampa americana*, *ibid.* fig. 13.) It may, however, by readily distinguished in the larva state from the latter, by having along its back a row of eleven irregularly shaped, white blotches instead of a continuous white stripe. Its eggs, like those of the latter, are laid in a cylindrical ring round a twig, but they may be distinguished by the cylinder being almost squarely docked at each end, instead of sloping off considerably at each end so as to present an oval appearance; and also by their much less densely plastered over with brown cement by the mother moth. I am indebted to Mr. Peter Ferris, of Orleans County, North Western N. Y., for specimens of this insect, both in the egg, larva and pupa state; and as authors hitherto seem to have given a somewhat incorrect account of the habits of the larva, I shall now copy what he says on the subject. Both Harris and Fitch, it may be observed, assert that this larva lives in large communities under a common web or tent, which is made against the trunk or beneath the principal branches. The young larvæ, which I myself hatched out from the egg, did indeed spin a common web; but they lived *on* it and not *under* it. According to Mr. Ferris, after the larvæ have attained some considerable size, they spin no webs at all. In a somewhat similar manner, the common Tent-caterpillar lives in society under a common web till it is about $\frac{3}{4}$ grown, and then deserts it, each shifting for itself as it best may.

These worms make their appearance on Apple-trees at or about the same time or soon after the common Tent-caterpillar of the Apple-tree. When they begin to grow, they soon spread over the tree, feeding on the leaves as they come to them, instead of being confined to one branch until all of its leaves are consumed. When the weather begins to get warm, they may be seen gathered in the sunshine, in bunches or patches on the upper side of some of the higher limbs, but without spinning any web. In hot days in June, when the worms are getting large, they often gather in large bunches on the lower limbs near the trunk, and on the trunk of the tree, out of the sun, still spinning no web. These bunches are from a few inches to two or three feet long and often many inches in width. On large trees that have been neglected there are often found as many as eight such bunches, of different sizes; making undoubtedly in some of the worst cases several quarts of worms. After they are about half-grown, they become very voracious, often stripping a large tree, that had previously appeared but little injured, in a few days. They are great travelers, not only in going all over the top of a tree, and from one tree to another; but when one orchard is used up, they will go to another. On such occasions they seem to prefer a smooth track like a hard road, or a board fence with a cap-board on top of it, along which they travel with great rapidity. They are much the worst where several orchards lie close together. Within a circle of not much more than half a mile from where I am now writing, there are 12 orchards. The damage done in these orchards in 1866 cannot be less than one thousand dollars; and counting the labor expended in killing worms, in those that were taken care of, must be much more. On all trees and parts of trees stripped of their leaves, there will not only be no fruit in the following year, but the trees themselves are always more or less injured, the numerous dead limbs indicating that they cannot stand such treatment many years longer. Isolated orchards are much less liable to be troubled with this pest.

These worms have been more or less troublesome in Western New York for twelve years or more. They have a peculiarity sometimes observed in other insects, name-

> ly, of disappearing in particular seasons. Some nine or ten years ago they were very destructive in this neighborhood, some orchards being entirely stripped. Yet the next summer there was scarcely one to be seen. In 1867 they have swarmed here worse than they ever did before.
>
> Harris states that the Tent-caterpillar of the Forest occurs on "oak and walnut trees," (*Inj. Ins.* p. 375), and Fitch classifies it as one of the larvæ found on Oak. (*N. Y. Rep.* II, § 321.) There is considerable Oak and Walnut timber in this section, but I have never seen or heard of any larvæ, such as those which infest our apple-trees, being found on those trees. A neighbor of mine has a butternut (Juglans cinerea) in the middle of his orchard, that has not been eaten at all in 1867, while he has had great difficulty in saving his apple-trees. And to-day I have seen a butternut standing in full leaf on one side of an orchard, where the apple-trees are stripped all around it. Another neighbor has several black-walnut trees (J. nigra) along the road by his buildings, one of which is almost, if not quite, in actual contact with his apple-trees. Yet these trees are never troubled, while the caterpillars are very bad in his orchard. Next to apple-trees they appear to prefer black ash, white ash and basswood. I have just been to the woods, and find many of these trees nearly denuded of foliage, while oak and walnut in the immediate vicinity are not injured. They are also found on beech and dogwood, and we meet with a good many on quince bushes. I understand that they work on pear-trees also this year. Cherry-trees are not much injured by them.

The only other locality, besides Western New York, where this insect has ever been noticed as swarming on apple-trees, is the State of Maine, as has been recorded by Harris, but exclusively in the later editions of his *Injurious Insects*, (p. 375.) I suspect that certain caterpillars seen on apple-trees in Maine in 1866, by Mr. G. E. Brackett, which built no tents and yet strongly resembled the common Tent-caterpillar, could have been nothing but our friend from the Forest. Mr. Brackett, however, suggests that "there may have been something in the weather which caused the departure from their general habit of tent-building," and asserts that they are "the true tent-caterpillar." (*Maine Farmer*, June 28, 1866.)

As to the question whether this same larva ever feeds upon oak and walnut, as stated by authors, it may probably be the case that there are distinct races of this species feeding on those particular trees, and indisposed or incapacitated to feed upon apple-tree leaves. Thus there is a distinct race, or as I have called it "Phytophagic species," of the Handmaid Moth (*Datana ministra*), which, as I have experimentally proved, will feed upon Walnut or Hickory, but will starve upon Oak or Apple-tree; and another distinct race, which feeds upon Oak and Apple-tree, but will starve upon Walnut or Hickory. Many other such cases I have already published as occurring in America, and many more may be met with scattered through the works of European Entomologists as occurring in the Old World. For example, Curtis has recorded the very remarkable fact, that in England the larva of the Sawfly of the Turnip (*Athalia spinarum*) generally attacks exclusively the common Turnip, but in particular localities attacks the Swedish Turnip exclusively. (*Farm Insects* p. 50; see also, on this subject, a Paper by Mr. McLachlan in *Trans. Ent. Soc. London*, 1865, p. 467.)

In confirmation of the above theory—which, however, requires further and fuller investigation before it can be finally adopted as certain—it may be remarked that S. R. Williams, M. A., Principal of the Sayre Institute in Kentucky, writes me word that "he finds the Tent-caterpillar of the Forest (*Clisiocampa sylvatica*) only on Black Walnut (Juglans nigra);" and Mr. Ferris has called my attention to a paragraph in the *Evening Journal*, (Albany, N. Y.,) stating that "the Army-worm is now [1867] committing great ravages in the oak forests of Virginia," and subsequently observing that the same worm is very destructive to the orchards in Niagara Co. in Western New York. The same fact, namely, that this insect "is sometimes so plentiful in Virginia as to strip the oak-trees bare," had previously been recorded by Abbott, but on very insufficient grounds, has been discredited by Dr. Fitch. (See Harris *Inj. Ins.* p. 375, and Fitch *N. Y. Rep.* II, § 321.) On the whole, unless we adopt some such theory as the above, it seems difficult to account for the circumstance that, while the Tent-caterpillar of the Forest occurs, according to Harris and Fitch, generally throughout the Eastern States, it should only have been proved to attack the Apple-tree there to any noticeable extent in two localities, namely, Maine and North Western New York.

All the Tent-caterpillars, instead of belonging to the Owlet-moths (*Noctuæ*), belong to the great group of Spinners (*Bombyces*). Like the Cotton-caterpillar, but unlike the true Army-worm, they all make their cocoons above ground, and they agree with the true Army-worm and differ from the Cotton-caterpillar in there being but one brood of them in one year. Like both these two insects, they come out into the Moth state the same season. As is usually the case with the Spinners, the cocoon of all the Tent-caterpillars is constructed of silk, spun from the mouth of the larva. But instead of spinning its cocoon in out-of-the-way holes and corners, as is the habit of the common Tent-caterpillar, the Tent-caterpillar of the Forest, as I am informed by Mr. Ferris, always spins it upon trees, folding together one or more leaves by way of envelop for its cocoon, and often deserting the tree it had fed on for this purpose.

Mr. Ferris having sent me seven or eight of these larvæ, and selected the smallest specimens he could find, for convenience of packing, they were every one of them a day or two afterwards destroyed by the larvæ of parasitic two-winged Flies, belonging to the *Tachina* family, which dropped from their bodies on the ground, leaving the shrunken skins of their victims strongly adhering, as is usual in such cases, to the surface upon which they had rested in the agonies of death. Similar parasitic larvæ largely infest the true Army-worm, as I have shown, and also the larvæ of the Handmaid Moth (*Datana ministra*), which in some sections of country is a great pest upon apple-trees. What percentage of the whole crop of these Tent-caterpillars in Western New York is destroyed in this manner, it is impossible to say with any certainty; but I strongly suspect that it is only the dwarfed and stunted specimens which are thus infested, and that Mr. Ferris unconsciously selected his best friends to be banished to the Far West, when he picked out the smallest specimens he could find to send me, leaving such full-sized worms as were not infested by parasites, by way of seed for another year.

But besides these *Tachina* flies, which, except in the tip of the abdomen never being red, are scarcely distinguishable from the species (*Exorista militaris* Walsh) infesting the true Army-worm, there is an *Ichneumon* fly which also preys upon this enemy of the Apple-tree in the State of New York, but apparently only to a limited extent. For, from a lot of about 50 cocoons sent me by Mr. Ferris, I bred one male and two females of an undescribed species of *Pimpla,* very closely allied to *P. melanocephala* Brullé, but differing from that species in the head being red and not black. Hence, as there are two distinct parasites now proved to infest this insect in New York, we can readily understand, why in particular years it is very scarce there, and in other years occurs in destructive swarms.

The moths produced from the above cocoons, which came out from July 10th to July 24th, are exceedingly variable in coloration, ranging from buff to brown, and some specimens having the "broad red-brown band across the front wing," noticed by Harris as an occasional characteristic of the species, and others being entirely without that band, with all the intermediate grades in both characters. On the closest comparison with a specimen of the moth formerly received by me from Eastern New York, and probably reared upon some forest-tree, I can detect no specific distinctions whatever. Possibly there may exist constant distinctive characters in the larvæ of the several races, feeding respectively on Oak, on Walnut, and on Apple-tree and other trees; but upon this point I am not at present prepared to give an opinion. Certainly, the Apple-tree feeding larvæ agree sufficiently well with the descriptions of Harris and Fitch, which are probably based upon larvæ feeding on Oak or Walnut-trees.

Evidently, as with the common Tent-caterpillar, the cheapest and easiest and most convenient way of getting rid of this pest is to cut off and destroy the bunches of eggs in the dead of the year, when the leaves are off the trees and when farm work is not usually pressing. In badly infested Orchards this, however, will be found to be a considerable task; for, according to Mr. Ferris, in such cases from fifty to one hundred rings of eggs are often found on a single tree. And, after all, to make this plan thoroughly effectual, whole neighborhoods should unite in carrying it out; otherwise one is liable to have a fresh crop of eggs laid every summer upon one's apple-trees, by the moths reared by less careful neighbors.

It will now, I hope, be clearly perceived that the true Army-worm is as distinct from this Tent-caterpillar of the Forest, which has been misnamed "Army-worm," as a Hog is from a Dog. The former lives exclusively upon herbaceous plants and chiefly upon the grasses; the latter lives exclusively upon the leaves of trees. The former is an Owlet-moth; the latter is a Spinner. The former goes underground to pass into the pupa state; the latter spins a silken cocoon in the open air. The former is the special enemy of the Grain-farmer and Stock-farmer; the latter of the Orchardist. Finally, the former can be attracted in the night by sugary substances, having a long tongue adapted for sucking up honey; the latter cannot be thus attracted, having only a short rudimental tongue, which is incapable of reaching the nectaries of honey-bearing flowers. It would be easy to point out a whole host of other structural differences; but for the general reader the above will probably be sufficient. It would puzzle many a farmer to catalogue more points of difference between a Dog and a Hog. He will exclaim, perhaps, that the general appearance of a Dog is entirely different from that of a Hog, while in his eyes a Tent-caterpillar and a true Army-worm look almost alike. But this is only because he has studied one group of animals, and has paid but little attention to the other. For, in the eyes of an Entomologist, the one kind of larva has an entirely different appearance from the other; and the same may be said of the Moths produced from the two larvæ.

By way of illustration of the confusion between different kinds of so-called Army-worms, I subjoin a paragraph, which appeared recently in the *New York Tribune*, (June 25, 1867.) The insect here referred to is manifestly the same Tent-caterpillar of the Forest as has been illustrated above. But, as will be seen, the Editor doubts whether it is the real Army-worm of the South, and, if not, he thinks it must be the so-called Caterpillar of New England. In point of fact, it is neither.

> The Army Worm.—In Niagara County, Western New York, the Army-worm is committing dreadful ravages among the orchards. In places, the whole population turns out to do battle to save their fruit and gardens. They attack a tree in such numbers as to cover the leaves and fruit, which they utterly destroy. If the trunk of a tree is covered with tarred paper they cannot ascend it, and they start for another orchard. It is doubtful whether this is the real Army-worm of the South. but it is probably the Caterpillar of New England. If it is the Army-worm, its progress can be stopped by plowing furrows and then digging ditches eight inches deep with straight sides. Into this they will crawl, and only with great difficulty can they get out. Then strew straw over them, set it on fire, and their day is done.

The "tarred paper" can evidently be effectual only in preventing these caterpillars from migrating from tree to tree along the ground. And as to digging ditches to stop them, it would be necessary also to tear down the board fences; for according to Mr. Ferris, they commonly make a roadway of the cap-board.
B. D. W.

THE LITTLE TURK AND ITS CRESCENT.

[From a letter from Franklin C. Hill, of Ohio.]

In one of the late numbers of the Practical Entomologist, you have a very thorough article on the Curculio, which I read with much interest; but yesterday, having the chance to see no less than four specimens in the act, I feel called on to correct your informant as to the way of depositing the egg. She first bores the hole as spoken of, not straight in, but slanting backwards, so that the egg cavity is just below the skin, pushing her snout down under herself. She then turns round and drops her egg into the hole which she has bored; turns again, pushes the egg home, and cuts the usual crescent in front of the hole, so as to undermine the egg, and leave it in a kind of flap formed by the little piece of the flesh of the fruit which she has undermined. Can her object be to wilt the piece around the egg and prevent the growing fruit from crushing it?

After watching two go through the work, I called on Mr. Orton, with a plum in which an egg was, without the crescent, and we adjourned to his cherry-tree and saw two more do it. So intent is she on her work, that Mr. Orton cut off the cherry with scissors and brought it down without stopping her. We did not time her, but I should think it must take at least five minutes to place an egg.

Remarks by B. D. W.—On careful examination, I am satisfied that Mr. Hill is correct in the above statement; and I have little doubt that his mode of accounting for the peculiarities of the operation is the true one. The statement in the Practical Entomologist, to which he refers, (Vol. II, p. 76) was based, not upon my own personal observations, but upon what I found recorded in books.

THE APPLE WORM.

(*Carpocapsa pomonella.*)

This imported pest is ruining the apples and pears in all quarters this year. From Pennsylvania to Iowa, all accounts agree that it was never so destructive before. What is very remarkable, the same species, as I have experimentally proved by breeding the moth, has attacked the native Crab-apples near Rock Island, Ill. I have proved in the same manner that the species attacking the pear is identical with that which attacks the apple.

SPINDLE-WORMS.

Dr. Harris long ago described the transformations of a worm, that commonly bores the stem of young Indian Corn, and is known as the "Spindle-worm," naming the moth which is produced from it *Gortyna* (*achatodes*) *zeæ*. He further states that it is not confined to Indian corn, but sometimes bores the pith of the Elder, and sometimes the stem of the Dahlia. (*Inj. Ins.*, pp. 138—9.)

In the *Prairie Farmer* of Feb. 23, 1867, Mr. Riley has for the first time described the preparatory states of the moth, which had been previously named and described by the great French Entomologist Guenée, as *Gortyna nitela*. He found the larva of this moth to bore the stems of the Dahlia and Aster, and probably supposing it to be peculiar to these plants, he has named it the " Dahlia and Aster stalk-borer." Like Harris's species, however, it inhabits both the stem of the Dahlia and the stalk of our Indian corn. For from a larva found in a corn-stalk I bred many years ago, on the 4th of September, the very same species of moth that Mr. Riley obtained in the fore part of September from Dahlia and Aster stems. The pupa is remarkable for not having, like the pupa of most other moths, a simple thorn at its tail, but a pair of slender thorns horizontally arranged, each about 1-16th inch long, which the insect when alive has the power of opening out in the form of an inverted V, or at discretion shutting them together so as to appear like a single thorn. This arrangement no doubt enables it to work its way out of the corn-stalk with more facility, preparatory to its bursting forth in the moth state; just as the hoof of an ox, which is capable of spreading open in a fork, does not sink so deep in a mud-hole as the hoof of a mule, which is about the same size, but is one solid piece.

The difference in the habits of the true Spindle-worm of Harris and this other Corn-stalk borer appears to be this: The former usually attacks the corn-stem when it is quite young, and before it shoots much upwards; the latter attacks the corn-stem, as a general rule, after it has shot up to some considerable height. The distinction, however, between the two is practically of no importance; for both are equally destructive to the crop, and both should be slain without mercy wherever they are found.

The curious inquirer may perhaps ask, how a moth which comes out in September, like Mr. Riley's insect, can manage to propagate its species, seeing that corn is an annual plant, and Dahlias die down to the root every winter. Manifestly it would be no use for the moth to attach its eggs to Dahlia stalks or corn stalks in September; for long before the larva could hatch out from the egg and attain any size, the stalks would be dead, dried up and destroyed. But in this, as in many similar cases, for example in the case of the common "Curculio," the perfect insect must, I think, live through the winter in the perfect state; and by the few that survive till the following spring the eggs are deposited in the course of the spring, on the young corn and young Dahlia plants, whence the crop of borers for the following year takes its origin. Doubtless the great bulk of them perish in the winter; for it is in the winter that insectivorous animals are the hardest pushed for food, and ransack every hole and corner where an unfortunate moth attempts to hide itself. But for this beautiful provision of nature, and supposing the moth came out in the spring, it would be almost impossible to grow corn; and where we now find one corn-stalk infested by the worm, we should then find almost every stalk in a field of corn bored up and worthless.

When we are disposed to grumble at the severity of our winters, and to wish that spring and summer could last all the year round, with flowers ever blooming and crops ever growing, we should recollect that one chief check would, in that event, be removed from the multiplication of noxious insects. For example, but very few house-flies escape through the winter to propagate the breed in the succeeding spring. But if we had perpetual summer all the year, they would increase in a wonderfully rapid geometric progression from one year to another, just as they now increase, from a slender start in the spring, but in the same geometric progression, till about the close of the summer they become almost an unbearable nuisance.

B. D. W.

A PLANT GROWING OUT OF AN INSECT.

Mr. Gilbert, of Tipton, Cedar Co., Iowa, sends me a specimen of the common "White Grub," or larva of the May-bug, (*Lachnosterna quercina*), with a root over an inch long, and also a short sprout, growing out of the two corners of its mouth in the place where the lower pair of jaws or "maxillæ" ought to be. So firmly is the plant imbedded in the mouth, that it could not be detached by any reasonable force after the specimen had been well soaked in hot water. It is said to have been "found by Mr. Paulding in wet soil, about 1½ inches below the surface, and when found the shoot was of a light green color and thrifty."

But the most remarkable thing is that, as Mr. Gilbert informs me, "there were large numbers of such specimens turned up by the plough, and the root came from the worm in exactly the same part of the body in all; in some there was a shoot starting as well as a root." "Mr. Paulding," it is further remarked, "has planted out some of them to see what they will result in."

If only a single such specimen as the above had been met with, we might account for it by supposing, that the larva had accidentally died with the undevoured seed of some plant in its mouth, and that this seed thereupon vegetated and grew, using the body of the larva as manure to aid it in its growth. But how can we account for the "large numbers" of these specimens found in one place, at one time, and by one man? I can only explain these singular circumstances by supposing, that some particular kind of seed is poisonous to this larva, although the instincts of the larva do not prompt it to reject such seed as food. Hence it is to be hoped that Mr. Paulding's experiments will be continued, until he clearly ascertains what plant is produced from this vegetative larva. Possibly we might turn such knowledge to practical account, by sowing this particular kind of seed in places infested by the White Grub, and especially where, as with young trees in nurseries, we cannot conveniently reach our enemy with the plough, the hoe or the spade.

B. D. W.

THE IMPORTED GOOSEBERRY SAWFLY.

In my Article on this insect in the last number of the first Volume of the PRACTICAL ENTOMOLOGIST, I showed that the fact of the larva changing in its last moult to green, and losing the numerous black, hair-bearing tubercles that characterize it so remarkably in its early stages, had been overlooked by certain authors both in Europe and America. Hence, I doubted whether such a change invariably took place. But Dr. Smith having kindly sent me a number of these larvæ in a very early stage, I have clearly ascertained that it does; and a correspondent from Columbia County, N. Y., who has also been investigating the same question, has arrived at the same result. After the last moult the larva invariably becomes of a very pale green, with the 1st and 11th joints, more or less of the anterior part of the 2nd and the posterior half of the 12th, all bright gamboge-yellow.

According to the gentleman referred to above, this is the third year that they have been troubled by the insect in Columbia County, "and so great have been their ravages this year in Canaan, in that county, and various other places, that even hellebore in very large doses has not proved a sufficient remedy." Columbia County lies to the east of the Hudson River; so that if, as it appears, this pest was originally imported from Europe at Rochester, N. Y., it has already travelled eastward 225 miles.

THE COLORADO POTATO BUG.

As I predicted, this insect has now spread into Southern Michigan and Western Indiana. According to Dr. Warder, it occurred in the latter locality even in 1866. A correspondent from Leavenworth, Ks., indignantly denies that this insect ever infested the Potato in his State, and accuses me of slander in making such an assertion. If he will refer to the PRACTICAL ENTOMOLOGIST, (Vol. I, p. 1,) he will find that Mr. Murphy, of Atchison, Ks., had his potato-vines overrun by them in 1861; and so recently as 1866 Prof. W. S. Robertson, of the Indian Orphan Institute, Highland, Ks., mentioned the fact that they were abundant in his vicinity in a letter to me. If Leavenworth has hitherto escaped their ravages, it is no more than what I have recorded as having happened elsewhere. Last year, for example, Putnam Co. in Illinois escaped the Colorado gentlemen, though they swarmed in the two Counties immediately north and south. This year, as the Papers state, Putnam is swarming too.

B. D. W.

APPLE-TREE PLANT-LICE.

(*Aphis mali.*)

I had noticed the eggs of this insect to be unusually abundant last winter on Apple-trees, and as soon as the first warm days caused the buds to expand a little in the beginning of May, the young larvæ gathered in swarms upon them; and this not only on the tame Apple-trees, but also on the wild Crab-trees. As I had received the eggs of this insect from various Northern States, with accounts of their being very numerous everywhere, I hence inferred that our Apple-trees were going to be much troubled by Plant-lice in the spring of 1867. (See Answer to Peter Ferris, PRACTICAL ENTOMOLOGIST, II, p. 97.)

Now mark how dangerous a thing it is to prophecy, except in the single case where a prophet has the power of fulfilling his own predictions, as, for example, when a physician predicts the death of his patient. In the middle of May we had in the North Western States one or two pretty sharp frosts, which, however, did no material injury to the fruit, as the blossoms were not expanded. But although the *eggs* of the Apple-tree Plant-lice had stood without any damage a temperature of some 15 or 20 degrees below zero, on several occasions during the winter of 1866-7, yet the *young larvæ*, freshly hatched out, and as tender and delicate as so many babies, could not stand a temperature of some 25 or 30 degrees above zero, in May, and perished wholesale, and as if they had been swept away by the besom of destruction On inspecting my apple-trees, where three weeks ago every bud was alive with Plant-lice, I cannot now (May 25) find a single living individual. It might be thought at first sight that, as often happens in the summer, the whole generation of them had been destroyed suddenly by their numerous Insect Foes. But the weather has continued so unusually cold, that these foes of theirs have none of them yet stirred out of their winter quarters. Consequently the poor unfortunate little lice must all have been frozen to death—brought to an untimely end—and descended to the grave of the bad bugs,

"Unwept, unhonored and unsung."

After all, perhaps, I ought not to repine at this melancholy catastrophe. For though I may lose in reputation as an infallible prophet, yet I shall probably make it up to myself by a more abundant crop of apples. B. D. W.

THE TENT-CATERPILLAR OF THE APPLE-TREE.

(*Clisiocampa americana.*)

This insect was unusually abundant in 1866 all over the country, and this year is unusually scarce, at least in my own neighborhood. The above is, no doubt, attributable to its eggs having been largely depredated upon last season by a minute species of Egg-parasite, belonging to the *Pteromalus* group of the great *Chalcis* family. I bred great numbers of them last summer, and from the eggs ascertained that they were apparently the same insect which Dr. Packard bred in 1863, in the same month (August) from the same eggs, and which he erroneously, as it seems, referred to the genus *Platygaster*, in the *Proctotrupes* family. See his article on the subject in the first volume of the PRACTICAL ENTOMOLOGIST, pp. 14—15.

B. D. W.

A NEW FOE OF THE CORN.

Mr. J. J. Thomas, of New York, has received a snout-beetle from a correspondent in Onondaga County, N. Y., who states that "it is making sad havoc with corn-fields, destroying whole fields in some instances." This beetle, of which Mr. Thomas has sent me specimens, is a species of *Sphenophorus*—a genus closely allied to *Sitophilus*, which includes the true Grain Weevil and the Rice Weevil—but neither Dr. LeConte nor myself have been able to identify it with any described species. What is very remarkable and illustrative of the well-known fact, that in particular seasons certain insects will swarm, and then not be heard of again in any considerable numbers for many years; I lately received the same insect from Mr. Paschall Morris, the Publisher of the *Practical Farmer*, with a similar account of its operations in Pennsylvania. He states as follows: "A farmer at Concord, Delaware County, Pa., found numbers of this insect destroying the young shoots of corn which they puncture with their proboscis. They are found near the top of the ground. Most generally the corn dies; but if it survives, as the leaves unfold they show the punctures, which look like shot-holes. He found four of these insects to one 'heart-worm,' as the Pennsylvania farmers call it. [Probably the insect called 'spindle-worm' in New England, which burrows in the heart of the young growing corn and produces a moth—the *Gortyna zeæ* of Harris. The same worm appears to be called the 'bud-worm' in North Carolina.—B. D. W.] This insect never appeared in Delaware Co. before this season, and it is doing great damage to the corn." So far as I am aware, the above facts are quite new in Economic Entomology.

Like several other species of *Sphenophorus*, this beetle appears to feed in the larva state on moist wood, situated in places where it is continually washed by water. Near Rock Island, Ill., I have often met with it, and with several other species of the same genus, in decayed logs floating in our sloughs; and once I found it absolutely swarming, in company with five or six other species of the same genus, on the lake beach at Chicago, close to the wood piers at the mouth of the harbor. No doubt, in the larva state, it had lived upon the decaying and moist wood of these large piers. Its feeding on living vegetable substances when in the perfect beetle state, and on decaying and dead vegetable substances when in the larva state, is analogous with many facts well known to entomologists. For example, the Spotted Pelidnota, (*Pelidnota punctata*, figured in Harris, p. 25, and in Fitch's *N. Y. Reports*, Plate 2, fig. 6,) devours the leaves of the grape-vine in the perfect beetle state, and in the larva state lives on rotten wood. Judging from the habits of the larva, I am persuaded that this snout-beetle can only annoy the farmer in situations where there is a large accumulation of decaying drift wood, &c., in wet places, or at all events, a few miles from such situations. We may observe that Onondaga County, N. Y., encloses at one end Lake Skeneateles, which is 15 miles long, and at the other end borders upon Lake Oneida, which is 21 miles long; and that Delaware County, Pa., abuts on the Delaware River below Philadelphia. Hence, having bred in the moist drift-wood, &c., generally to be met with in such large bodies of water, and being possessed of a good pair of wings, this beetle is enabled, whenever it chooses, to fly off to the neighboring cornfields. In seasons when it has bred in moderate numbers, it is probably never noticed on the corn; but when in certain seasons it swarms—as often happens with a great variety of other insects—then its ravages become at once apparent to the eye and immediately attract attention.

It only remains to give a brief description of this insect, so that it may be recognized hereafter, whenever detected in the same operations.

Sphenophorus zeæ, new species? (The *Corn Sphenophorus*). Color black, often obscured by yellowish matter adhering to the hollow places, which, however, can be partially washed off. Head finely punctured towards the base, with a large dilated puncture between the eyes above. Snout one-third as long as the body, of uniform diameter, as fine as a stout horse-hair, and curved downwards. Before the middle of the thorax a polished diamond-shaped space, prolonged in a short line in front and in a long line behind; and on each side of this an irregularly defined polished space, somewhat in the form of an inverted Y; the rest of the thorax occupied by very large punctures, which fade into finer and sparser ones on the polished spaces. Wing-cases with rows of still larger punctures, placed very wide apart in the usual grooves or striæ; the sutural interstice, that between the 2nd and 3rd striæ, and that between the 4th and 5th striæ wider than the rest, elevated, and occupied by very fine punctures; a small elongate-oval polished spot on the shoulder and another near the tip of the wing-case. Beneath, polished, and with punctures as large as those of the thorax. —Length about three-tenths of an inch, exclusive of the snout. Comes very near *Sphenophorus truncatus* Say, but the snout is not "attenuated at tip" and has no "elongated groove at base above;" and moreover, nothing is said in the description of that species of the very large and conspicuous punctures, found in the elytral striæ of our species.

Since the above was written, specimens of the same insect have been received from Robert Hervell, of Tioga County, N. Y., who gives the same account of their depredations on young corn, and says, that the sap flowing from the wounds made by them attracts myriads of ants, whence some of his neighbors have erroneously supposed that it was the ants that were the authors of the mischief.

He adds, that he noticed the insect upon young corn for the first time in 1866, when they were even more injurious than in 1867; and that he learns, that in 1867 some fields of corn near the Susquehanna River are nearly ruined by them.

It appears from the *Rural New Yorker* of June 29, 1867, that Mr. L. V. Smith, of Geneva, Ontario County, N. Y., had his corn troubled by this same beetle in 1866, and that in 1867 "they have increased to an enormous quantity, particular fields furnishing from six to twelve beetles to each hill." The Editor says, that "Dr. LeConte calls it *Sphenophorus antiquus;*" but I know of no species described by any one under that name. Certainly, in 1861 Dr. LeConte was unable to name the species for me.

It may be observed that Geneva, N. Y., lies upon Seneca Lake, and that Tioga County, N. Y. lies upon the north branch of the Susquehanna River, in the immediate vicinity of which river the beetle, according to Mr. Hervell, has been most destructive. These facts seem to confirm the theory advanced above, namely, that the beetle breeds in marshy places in decaying wood, and migrates thence on to the corn. May it not be possible that it is sometimes carted out on to cornfields in swamp muck? It would be interesting to learn, whether fields that have been manured with swamp muck are more largely infested, than those which have not been so treated.

ANSWERS TO CORRESPONDENTS.

Henry K. Smith, Ill.—The large four-winged fly, with a three-fold tail as fine as a horse-hair, of which you send a very good drawing, can be nothing else but a female of *Pimpla* (*rhyssa*) *atrata* Fabr. The long tail is the instrument which it uses for inserting its eggs into the solid wood of a tree; and it was long ago remarked that they often get stuck fast in performing this operation, just as you have yourself observed. You will find a good woodcut of your insect in *Harris's Inj. Ins.* p. 539; and it is tolerably common everywhere in the Northern States. But instead of, as you surmise, "killing the hickories," which you found them piercing with their ovipositors, they do just the contrary. *They are your friends and not your enemies.* They are a species of the multifarious group of *Ichneumon* flies, and pierce the solid timber in order to reach the larvæ of certain timber-borers, and deposit their eggs in these larvæ. Most usually it is the larva of another large four-winged fly (*Tremex columba*), belonging to a very different Family, which they attack in this manner; and of the perfect fly of this last you will also find a figure in Harris (p. 536.) If you had extended your examinations, you would probably have found the larva of this Fly, which belongs to the *Urocerus* family in the Order Hymenoptera, at the bottom of the puncture made by the ovipositor of your insect.

Dr. Wm. M. Smith, N. Y.—Judging from the specimens you send, the Red Cedars in your neighborhood have been destroyed, not by any insect, but by a parasitic fungus. Whether or not this fungus is known to Botanists, I am not aware. Perhaps Sulphur dusted upon the trees might be found as effectual in destroying it, as it is in destroying the two distinct funguses on the Grape-vine known as "Mildew" and "Rot." The large tracts of pine-trees, killed years ago in North Carolina, were destroyed by Bark-beetles.

L. D. Morse, Secr. Mo. State Bd. Agric.—The "gray-beetles" which are "doing a great deal of damage to the vineyards near St. Louis, and also at Bluffton, 80 or 90 miles west of St. Louis, eating both leaves and fruit," are the same "Grape-vine Fidia" (*Fidia viticida*) which I illustrated in the May number of this Journal. A single specimen mixed in with the rest belongs to the closely allied species *Fidia longipes*, which is black, instead of chestnut-colored, under its gray hair. It appears, therefore, that both these species depredate on the grape-vine.

A. M. Burns, Ks.—The larva boring the twigs and stems of your Currant bushes is the same Currant Borer (*Ægeria tipuliformis*), which I figured and illustrated in my Article on Borers in the 1st Volume of the Practical Entomologist, p. 29. It produces a moth, not a beetle, and is closely allied to the Peach Borer (*Ægeria exitiosa*). Like the Apple-moth worm, it is an Imported, and not a Native American species. The insects that are properly called "currant worms" feed externally on the leaves, not internally on the wood and pith. There are three distinct species of these last, as I showed in my Article on the Gooseberry Sawfly in the last number of Volume I of the Practical Entomologist. One of the three is a Native American species and is a "looper" or "measuring-worm," producing a moth or "miller;" and two produce four-winged Flies (Order Hymenoptera) belonging to the family of the Sawflies (*Tenthredo* family). Of these two, one, as I have shown, is a Native American species, and does comparatively but little damage; the other is an Imported species, which is gradually overspreading the country, and is destined to be as destructive to the Currant and Gooseberry as the Colorado Potato Bug is to the Potato.

L. Mitchell, Ct.—You inquire whether the so-called "Swamp-apple" on the Azalea is a proper fruit, or a gall produced by the sting of an insect. If you will send along specimens, I will tell you what they are; but there are no Azaleas growing in my neighborhood, so far as I am aware, and I do not know what you mean by "Swamp-apples." Because you understand what is meant by a local name, it does not follow that everybody else does.

J. M. K., Iowa.—The insects that, as you say, have destroyed your apple-crop for the last three years, are the same Rascal Leaf-crumpler (*Phycita nebulo*) figured and described by myself many years ago in the *Prairie Farmer.* The little worms inhabiting the horn-like cases, often secured by silken cables among the crumpled leaves of the twigs, change to small moths in July. I know of no remedy but to pick off and destroy the cases, which can be most conveniently done in the winter, when the leaves are off the trees.

M. W. Seaman, Ill.—The specimens found on cherry and apple-trees, some on the trunk and limbs and some in a piece of old cloth hanging in the tree, are the matured larvæ of the Twice-stabbed Ladybird, (*Chilocorus bivulnerus,*) enclosing the pupa. You will find a figure both of the larva and of the perfect beetle, in my Article on Plant-lice (Practical Entomologist II, p. 42.) As is there stated, the species preys upon Plant-lice and Bark-lice, and is consequently, not our enemy, but our friend.

C. Faxon, D. C.—The thousand-legged worm that infests the roots of your Strawberry plants, causing the plants to wither away, is not, as you suppose, the *Iulus* which I figured and described in the Practical Entomologist, (II, pp. 34 and 70.) Although it belongs to the same family as *Iulus*, yet it belongs to a very distinct genus (*Polydesmus*), which differs from *Iulus* in the joints of the body being much less numerous (about 20 instead of about 50), and in their being separated from each other by a wide space, instead of fitting closely one to the other, so that the whole body is almost as smooth as a goose-quill. The species sent is the *Polydesmus serratus* of Wood, which I have also received from New York as infesting gardens there. The experience of English gardeners, who have long been troubled with European species of this genus, shows that it does not, as you infer, confine itself to weak and sickly plants, but attacks perfectly vigorous ones, the sickly, withered appearance being the consequence of, and not the allurement to, its depredations. You say that "the least touch of hot water destroys them, without injuring the strawberry plants." This I can readily believe, from the fact that hot water will kill onion-maggots without hurting the young and tender onion-plants.—The cocoon found on your maples is that of the Basket-worm or Bag-worm (*Thyridopteryx ephemeræformis*), which has been repeatedly referred to in these columns.

N. H. B., N. J.—I can see no tokens of the work of insects in the specimens gathered from your cranberry vines; but, as they were not enclosed in any box, but simply folded inside your letter, they reached me dried up to nothing and pressed as flat as a board. Having, as you say, spent already some twelve thousand dollars on your cranberry plantation, you might have invested a few additional cents in postage stamps.

A. Gilbert, Iowa.—The pretty caterpillars, banded with orange and sky-blue, and with a conspicuous white patch on each side of the hind part of the body, are the larvæ of the Eight-spotted Forester (*Alypia octomaculata*)—a very beautiful moth. It is not a very common species in the Northern States, and has always been found where you met with it—feeding on the leaves of the grape-vine.

B. W. McLain, Indiana.—The depressed, oval, white, cottony masses, over ¼ inch long, and with a brown scale on one end of them, found on the leaves of the common Maple, are evidently the egg-masses of an undescribed species of Bark-louse, (*Coccus* family, Order Homoptera). The brown scale is the body of the female, as in other Bark-lice. Although the English name of this family is "Bark-lice," and although most of them do really inhabit the bark of various trees, yet many species—for example, one found on the Oleander—inhabit the leaves, as your insect seems to do. Since the above was in type, I have hatched out swarms of young Bark-lice from the specimens sent.

A. Gilbert, Iowa.—The minute oblong-oval white specks, so thickly salted over the bark of your apple-tree, are the larvæ of the Native Bark-louse (*Aspidiotus Harrisii*). You will find thinly scattered among them a few of the old last year's scales from which they hatched out, and also a few of the Imported Bark-louse (*Asp. conchiformis.*) I had prepared materials for an Article on the subject of these Bark-lice and the methods of killing them, but, like many other such Articles, it will now be crowded out of the Practical Entomologist.

M. M. S., Penna.—1st. When an insect, which lives aboveground in the larva state, passes the pupa state underground, it is always the larva that enters the earth and not the pupa. Occasionally such insects transform into the pupa state aboveground among dead leaves, &c., but in that event the pupa never burrows underground. 2nd. Most pupæ that pass that state underground have a peculiar apparatus for forcing their way to the surface, when the pupa-shell splits open in front and the winged insect emerges. Sometimes with this object in view the pupa is furnished with sharp thorns on its front part, sometimes the rings of the abdomen are provided with transverse rows of little thorns directed backwards, and very generally the tail is provided with from one to six stout thorns, by which the pupa gradually pushes itself forward to the light of day. By these means, even when the surface of the earth is baked hard, many pupæ work through it, but under such circumstances many more are retained underground and perish miserably. For these reasons, prudent breeders of insects always take care to keep the earth in their breeding-cages moderately moist.

P. B. Sibley, Mo.—No. 1, from potato vines, is the old-fashioned ash-gray Blister beetle (*Lytta cinerea*), which has infested the potato for time immemorial. (See Practical Entomologist II, p. 36.) No. 2, also from potato-vines, is the larva of the terrible New or Colorado Potato-bug (*Doryphora* 10-*lineata*), of the perfect beetle form of which, you say that you have found as yet only 5 or 6 specimens. Two years from now you will probably find bushels of them, and see to your cost how destructive they are. No. 3 is the immaculate variety of the Six-dotted Tiger-beetle (*Cicindela* 6-*guttata*.) It occurs exclusively in the woodlands, and its larva, as I believe, lives in rotten logs, preying on the larvæ that bore therein.

E. T. Snelling, N. Y.—The little jumping beetles, infesting a new variety of radish recently imported from England, are nothing but the common Wavy-striped Flea-beetle (*Haltica striolata*), which you will find figured on page 129 of Harris's *Injurious Insects.* This is one of several species of Flea-beetles, that commonly in this country infest young cabbages, radishes, egg-plants, &c., eating little holes in their tender leaves and often the entire leaf. I thought at first you might have imported among us the European Turnip-beetle (*Haltica nemorum*), which very closely resembles your species, and which is such a terrible pest in England to the turnip crop. But on referring to colored figures and descriptions, I find that in that species, the yellow stripe on each wing-case is quite differently shaped, although in other respects the two insects resemble one another almost exactly.

John Edgerton, Iowa.—The olive-green worm, or rather caterpillar, about 1½ inch long, which you found on the roots of Blue-grass, changes to some kind of "Miller" or moth of the group of Owlet-moths (*Noctua* family). I cannot say to what particular species it would change. Indeed but very little is known of the preparatory states of most of our moths. You might have noticed on the right side of the specimen nine little oval yellowish eggs, like so many flyblows, firmly glued to the skin. These are the eggs of a *Tachina* fly—a group of two-winged flies, many of which resemble Bluebottle flies, House-flies, &c. After a short time they would have hatched out into whitish maggots, penetrated the vitals of the worm and finally destroyed him, feeding themselves fat upon his substance. They would then have emerged to the light of day in the form of the parent fly that laid the eggs, ready to repeat the same operation upon other larvæ. From Army-worms infested in this manner I have myself bred a *Tachina* fly, and ascertained that, though several eggs are glued to each Army-worm, but a single one lives to be a fly, the others being probably either preyed on or starved out by their overgrown cannibal brother.

Wm. Prichard, Tennessee.—The egg-rings found on your Sugar-maples are apparently those of the common Caterpillar (*Clisiocampa americana*), which infests many other forest-trees. What proportion of the eggs will hatch out next spring, depends upon how many egg-parasites have preyed on them.

J. H. Foster, Jr., N. J.—Of the two Click-beetles (*Elater* family), which you found eating the fruit of your Philadelphia Raspberries, the large brown one is *Melanotus communis*, a very common species, the larva of which I believe to breed in decaying wood; the small red one with black markings is *Monocrepidius vespertinus*, a rather rare species with me, and of the history of which I know nothing. I formerly doubted Dr. Houghton's assertion that his pears were gnawed into by true Click-beetles; but it seems now that he was in all probability right on this point. Certainly there can be no mistake as to Click-beetles eating raspberries; for you say that you saw five specimens of the smaller Click-beetles on one raspberry, into which they had eaten their way for nearly half the length of their bodies.

J. J. Kelly, Missouri.—The boring-beetle, which you found imbedded in the solid wood in the but of a Pear-tree, is the common *Buprestis* borer (*Chrysobothris femorata*), of which I gave a figure and an account in the 1st Volume of the Practical Entomologist, (pp. 26—27). As you will find it stated there, this insect is a very general feeder, infesting not only the Apple-tree, but the Oak, the Maple, and a variety of other Forest trees. It has not, however, been as yet recorded as infesting the Pear-tree. The specimen reached me alive and in excellent order. It was not at all necessary to give him any ventilation. He would have lived for a week or more, corked up tightly in a small vial.

V. T. Chambers, Ky.—I must refer you on the subject of the three Hickory galls, made by a genus of Plant-lice that has been currently called *Phylloxera*, to a Paper of mine which has just been published in the *Proceedings*, (Vol. VI, pp. 275—6 and p. 282, note). I have long been acquainted with the winged insects of all these three galls. The subject is too dry for a popular Journal.

Wm. Kite, Penna.—The gall on the flower-catkin of the Chestnut is exceedingly interesting and hitherto new to science. It is produced by a minute Plant-louse, which, so far as can be discovered from the pressed and distorted specimens enclosed in your letter, belongs to a genus which has been called *Phylloxera*. You would have conferred an additional favor if you had thought to enclose the specimen, with the accompanying flies, in some small paste-board box. Instead of any of the flies reaching me alive, as you hoped, they were all dead and squashed—alas!—as flat as a board.

B. F. Lazear, Missouri.—The large clay-yellow beetle with six black spots on his wing-cases, is *Pelidnota punctata*—a species which has long been known to feed in the perfect state on the foliage of grape-vines. The larva breeds in very rotten wood. The small shining black Bugs, about the size and shape of a radish seed, are the *Corimelæna pulicaria* of Germar, and belong to the *Scutellera* family in the Order of True Bugs (Heteroptera). I have often noticed them swarming on flowers, &c., and I believe that they subsist on the juices of the plants that they inhabit. Almost all the True Bugs, except certain exclusively cannibal genera, emit when disturbed the nauseous odor of the Bed-bug, from two large openings on the lower side of their bodies. This is a defensive weapon with which Nature has provided them; and we see, or rather smell, the same thing in the common Skunk. The fact of their swarming in such numbers on your raspberries, as to render the whole crop offensive both to the smell and the taste and absolutely worthless, is new and very remarkable.

J. H. Parsons, N. Y.—The Striped Cucumber-bug (*Diabrotica vittata*, figured PRACTICAL ENTOMOLOGIST I, p. 110,) was ascertained, by Dr. Shimer of Illinois, to reside in the larva state inside the stems and roots of the vines or other plants that it infests. The writer in the *Agriculturist*, in saying that the eggs of the "Squash-bug" are found upon the leaves of the vines, is probably speaking, not of this insect, but of the Northern Ladybird, (*Epilachna borealis*, figured with its larva, PRACTICAL ENTOMOLOGIST II, p. 42;) for he distinctly states that the larva is "hairy." The insect (*Coreus tristis*, figured Harris *Inj. Ins.* p. 194,) which is properly called "Squash-bug" is evidently the one which the same writer subsequently refers to as "a large black bug near the roots of the plants." Thus we see that three distinct insects—two of them Beetles and one of them a True Bug—are all popularly confounded under the common name of "Squash-bug." In the same manner there are, as I have shown in the PRACTICAL ENTOMOLOGIST (Vol. I, No. 12,) three distinct larvæ—two of them producing four-winged flies, and one of them, which is a "measuring-worm" or "looper," producing a moth—which all feed on the Gooseberry and Currant, and are all popularly confounded under the name of "Currant-worm." The general reader usually considers scientific names as a nuisance; but there can be no greater nuisance than a popular name which means anything or everything.

Dr. Chas. Carpenter, Ohio.—The minute and almost microscopic creatures, which you have ascertained to cause "inflamed itching blotches in the summer on the persons of children and to some extent adults," are not true Insects but Mites, belonging to the same Class (*Arachnida*) as Spiders, Ticks, the Mite that causes the common Itch, the Cheese-mite, &c. The mites which you find "in abundance on grass, currant-bushes, strawberry-vines, &c," are, I suspect, different from the specimens sent. I am acquainted with whole hosts of species found on plants, some of them causing curious galls and deformations and some apparently living at large; but none of them are identical with those which you send, although there is often a strong general resemblance. A minute red species closely allied to yours (*Leptus autumnalis*) is known in Europe as the "harvest-bug," and is said to bury itself in the flesh, producing tumors and intolerable itching, in the time of harvest.

G. S., Mass.—The small black Flea-beetles, swarming on your potato and tomato vines and eating numerous little holes in the leaves, are the *Haltica cucumeris* of Harris—a very common species. They have long been known to work in this manner. The single larva found on potato vines is that of a Ladybird (*Coccinella* family); protect and encourage him, for he is your friend. We are too crowded for space now in the PRACTICAL ENTOMOLOGIST to give an account of the habits, &c., of the woollen-moth.

M. H. Boye, Penna.—The disease of your grape-vines does not appear to be the work of insects; at least there are no signs of the operations of insects in the specimens sent. Of the insects sent, No. 1 is, as you suppose, the common "Curculio" (*Conotrachelus nenuphar*). No. 2, from Peach, is my *Conotrachelus cratægi*, found in swarms on the Thorn everywhere in Illinois. If this Snout-beetle habitually infests the Peach also, it is a new fact. No. 3 is one of the Click-beetles, (*Melanotus communis*,) and burrows into fruit, such as raspberries, &c., in the perfect state. The larva feeds on rotten wood. No. 4 is not a Beetle, but a Sawfly, (*Tenthredo* family, Order Hymenoptera). It is the two sexes of *Dolerus arvensis* of Say, who however describes the female only. The male, according to the general law which I have established among the Sawflies, is much darker colored than the female, lacking altogether her red markings. Many species of these Sawflies that come out early in the year haunt, as does this species, the flowers of fruit-bearing trees; but I do not believe them to be injurious. They may possibly even be beneficial, by carrying pollen from flower to flower, like the Bees, Wasps, &c. No. 5.—The small Flea-beetle is *Haltica helxines*, and varies prodigiously in color, specimens occurring that are blue, violet, green and metallic-brown. The larger beetle is, not a *Haltica*, but a *Bruchus*, belonging to a family of the Snout-beetles, and is nothing but our old friend the common Pea-bug, (*Bruchus pisi*). No. 6 contains three species. The broad one with flattened antennæ is *Lucidota atra*; of the other two the one with immaculate elytra is *Podabrus rugosulus*, the one with elytra edged with yellow is *Podabrus modestus*. All three reside under bark in the larva state, feeding on bark-eating and wood-eating larvæ; and in the perfect state also feed, to a limited extent, on other insects. The large clay-yellow beetle with 6 black spots, feeding exclusively on grape leaves, is *Pelidnota punctata*, notorious everywhere for the above habit; the other is one of the Capricorn Beetles, (*Desmocerus palliatus*,) and its larva is said to bore the common Elder.—All the specimens reached me in first-rate order.

Huron Burt, Missouri.—"The scorpion or lizard-shaped soft-looking insect, that preys on the eggs of the Colorado Potato Bug," is probably the larva of a Ladybird (*Coccinella* family). The green blow-flies, that haunted the currant-bushes infested by Plant-lice, were attracted there by the "honey-dew" exuded by the Plant-lice. (See my recent Paper on this supject, PRACTICAL ENTOMOLOGIST II, p. 39.) "The insect with a dark body, its back and sides covered with a white woolly substance," that preys on plant-lice, must be the larva of a *Scymnus*, (*ibid.* p. 42). The insect that for three or four years has ruined your honeysuckle by devouring the blossom-buds in the night, is most probably some one of the numerous kinds of Cutworms that are now ascertained to mount trees for this purpose. Mr. Townley, of Wisconsin, found his honeysuckles to be infested by them in the same manner. "The large, stinking vine-bug, with the odor of the Chinch Bug," is, I suppose, the common Squash-bug, (*Coreus tristis*,) figured in page 194 of Harris's book. The other insects you mention I cannot identify from your descriptions.

Wm. C. Fish, Mass.—Of the two kinds of Hickory galls produced by Plant-lice, the small, roundish one on the leaflet, which opens with a slit below, is *Caryæglobuli* Walsh; the large roundish one on the footstalk of the leaf, which opens above usually in a cross, (X) is *Caryæcaulis* Fitch. The Beetles sent are *Serica iricolor* Say, *S. trociformis* Burm., (var. with rufous elytra), *Agrilus gravis* Lec., *Brachys ovata* Web. and *Cardiophorus gagates* Er. The Bug belongs to the *Scutellera* family and to Amyot and Serville's genus *Vulsirœa* and is very common here on oaks. I do not know whether it is described or not; but it is not among the species described by Say.—The Cranberry galls reached me in excellent order.

Thos. E. Hoge, Westtown B. S. Pa.—I can tell you nothing about the streak of thousands of small legless white worms, which you saw migrating over the sand and crawling over one another's backs as they traveled, except that they are the larvæ of some kind of Two-winged Fly. The specimens sent, having been simply wrapped in paper and enclosed in your letter, reached me dead and in very poor condition. If you had enclosed them in a tight tin box, along with some moist earth, they would probably have reached me alive and in good order, and I could then have told you more about them.

Jas. Barratt, Mass.—The monstrous yellow Butterfly that you saw in the woods the last of June, could have been nothing else but the large yellow Swallow-tail, (*Papilio Turnus*.) Some of the females of this species are truly gigantic. You will find this inseet figured in Harris's book, p. 268. The Rose-bug, (*Macrodactylus subspinosus*,) which as you say is swarming with you this year and doing a great deal of damage, does really, as you suppose, come out of the ground. Its larva lives upon the roots of plants, and changes into the perfect beetle underground.

D. W. Kauffman, Pres. Iowa State Hort. Soc.—The black blister-beetles that are infesting your potato-vines this year, near DesMoines, Iowa, are, as I have been informed by Mr. Ulke, the *Lytta* (*macrobasis*) *murina* of LeConte—a species not hitherto observed to infest the Potato. They strongly resemble at first sight the common Black Blister-beetle, *Lytta* (*epicauta*) *atrata*, which is said by Harris to infest potatoes in Massachusetts, but may be distinguished by the long second joint of the antennæ characteristic of the genus *Macrobasis*, and especially of the males, and also by having four raised lines placed lengthways on each wing-case. This last *atrata* neither myself nor Mr. Ulke have ever known to infest potatoes, and we only meet with it in the autumn on flowers, and chiefly on those of the Golden-rod (Solidago). May it not be possible that, in some cases at all events, the former species has been mistaken for the latter? The specimens reached me all alive and in excellent order.

J. Y. Smith, Wisc.—From your description, your worms seem to have been similar to those seen by Mr. Hoge; (see above;) but as you do not even send dead and dried up specimens, I cannot be certain.

S. R. Williams, Kentucky.—Your statement that "towards the end of June, 1867, you have destroyed several nests of the Tent-caterpillar (*Clisiocampa americana*) on your pear-trees," and that "two or three summers ago you had your pear crop greatly injured by them," is very interesting. On pear-trees, however, the occurrence of this insect is certainly rare and exceptional. As to your finding the Tent-caterpillar of the Forest (*Cl. sylvatica*) only on Black Walnut (Juglans nigra), see my Article on "The three so-called Army-worms."

A. H. Mills, Vt.—The larvæ now infesting your currant-bushes are the terrible Imported Gooseberry Sawfly, (*Nematus ventricosus*), respecting which see my Paper in the last number of the first Volume of the Practical Entomologist. "The common yellow worm with black dots," that formerly infested your Currant leaves, was probably the common Spanworm of the Currant (*Ellopia ribearia*); and the "very small green one" was perhaps my Native Gooseberry Sawfly (*Pristiphora grossulariæ*), an account of which you will find in the paper referred to above.

Dr. Wm. Maus, Ill.—The new enemy of the Colorado Potato Bug, which you saw "destroying the larva, and so intent on its prey as to retain its hold even when you gathered the leaf on which it stood," is, I believe, the *Lebia grandis* of Hentz. This beetle is one of the vast group of Ground Beetles (*Carábus* family), almost all of which are cannibals; but the genus to which it belongs, unlike most of the other Ground-beetles, haunts plants and is active by day, instead of living on the ground and being nocturnal in its habits. That others as well as yourself may recognize this species, I may here state that it is ⅓ inch long, with the head and thorax red and the wing-cases bright blue. The larger olive-green insect, about ½ inch long, that preyed on the larva of the Potato Bug last year, is a True Bug (Order Heteroptera) belonging to the genus *Rhaphigaster* in the *Scutellera* family. It is a very common species, and I have noticed it transfixing with its beak a wild bee ½ inch long appertaining to the genus *Andrena*; so that it seems to be rather a general feeder. This species, so far as I am aware, is undescribed. Other observers have noticed Bugs, belonging to this same family and probably to the same species, destroying the larvæ of the Potato Bug. Like all the rest of the *Scutellera* family, it emits when disturbed the peculiar odor of the Bed-bug and the Chinch-bug.—The leaf that you send bears on its surface the eggs of a Golden-eyed Fly (*Chrysopa*). You will find a figure of these eggs in my Article on Plant-lice. (Practical Entomologist II, p. 42.)—The Ladybird that your friend found among the Plant-lice on his Cherry-tree, is the Fifteen-dotted Ladybird (*Myzia 15-punctata*)—one of the few species found promiscuously in Europe and America.

Fred. Blanchard, Mass.—I cannot identify the large *Prionus* found in wool waste. It is most probably, as you suggest, an exotic species.

Tipton & Melliott, Ohio.—See Answers to M. S. Hill, in Practical Entomologist, Vol. I, p. 46. and to Thos. C. Wright, Vol. II, p. 8.

The Colorado Potato Bug.

I find the following in the Monthly Report of the Agricultural Bureau for September, 1866, p. 344:

Indiana County, Pennsylvania.—"Potatoes are being somewhat injured by the bugs." [Probably the ten-lined spearman, *Doryphora 10-lineata.*]

Mr. Glover must, I think, be in error here. The New Potato Bug cannot have yet reached Pennsylvania, though in eight or ten years' time from now the inhabitants of that State will probably be contemplating, with admiration, its beautiful rose-colored wings and striped wing-cases, as it flies into their potato-fields, looking as innocent as one of these little angels in crinoline. B. D. W

PUBLISHER'S NOTICE.

This number, or rather two numbers in one, closes the second and last volume of the Practical Entomologist. The reason of its discontinuance has already been given on page 104. At some future time, when there is enough interest taken by the Agricultural Community in the subject of Economic Entomology, to warrant the support of a journal of this kind, the publication of the Paper may be resumed.

Our thanks are due to many kind gentlemen for their valuable aid, but especially to Benj. D. Walsh for the faithful and handsome manner in which he has filled the Editorial Chair—a task which, we believe, could not have been so well performed by any other individual in America.

To the Agricultural Press in general, our thanks are also due for the many liberal notices given of our little Paper. Not having the money to advertise extensively in papers of large circulation, the existence of the Practical Entomologist has been made known almost entirely through the liberality of the Agricultural Press.

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